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SERIES A: AGRICULTURAL.

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CHAPAIS (J. C.). **The Larch Aphis.**—*13th Ann. Rept. Quebec Soc. Prot. Plants 1920–21*, pp. 39–40. Quebec, 1921. [Received 31st October 1922.]

The information in this paper on *Lachnus laricifex*, Fitch, has already been noticed from another source [*R.A.E.*, A, ix, 320].

KELSALL (A.). **Chemical Investigations of Sprays.**—*13th Ann. Rept. Quebec Soc. Prot. Plants 1920–21*, pp. 41–44. Quebec, 1921. [Received 31st October 1922.]

For arsenical insecticides to be efficient they must be soluble in the digestive juices of the insect or they will not kill, and they must be as nearly as possible insoluble in water to be safe for use on foliage. These conditions are best fulfilled by lead arsenate, of which there are three forms: $Pb_3(AsO_4)_2$ (tribasic lead arsenate), $Pb_4(PbOH)(AsO_4)_3$ (basic lead arsenate) and $PbHAsO_4$ (dibasic lead arsenate), the last being the most satisfactory from an economic point of view. Should foliage injury occur with the use of this compound, it may be explained by the existence of impurities in the water. In pure cold water there is a negligible amount of free arsenic acid concentration, but this amount is greatly increased in impure water, in which case basic lead arsenate should be used.

In mixtures containing an excess of lime, calcium arsenate should be used in place of the expensive dibasic lead arsenate. Calcium arsenate, though very insoluble in water, causes injury to foliage as the result of its reaction to carbon dioxide, which, however, does not take place in the presence of an excess of free lime. White arsenic cannot be used on foliage owing to its solubility in water; mixed with lime it forms calcium arsenite ($Ca(AsO_2)_2$), and this, though a relatively insoluble salt, is so readily decomposed that it also is highly injurious to foliage. If added to Bordeaux mixture, however, white arsenic loses its injurious properties under certain conditions, the cause of this not being altogether known. The term Bordeaux mixture covers any mixture of copper sulphate and lime. In the application of Bordeaux mixture to tender foliage, it should contain a large excess of lime to prevent the liberation of free copper sulphate.

CARON (O.). **The Potato Plant Louse.**—*13th Ann. Rept. Quebec Soc. Prot. Plants 1920–21*, pp. 45–46. Quebec, 1921. [Received 31st October 1922.]

Macrosiphum solanifolii was abundant on potatoes in certain districts of Quebec during August 1920. It also occurred on fruit trees, in which case the application of nicotine sulphate gave good results.

McLAINE (L. S.). **The Discovery of the European Corn Borer in Southern Ontario.**—*13th Ann. Rept. Quebec Soc. Prot. Plants 1920–21*, pp. 51–53. Quebec, 1921. [Received 31st October 1922.]

The bulk of this information concerning *Pyrausta nubilalis*, Hb., in Ontario has been noticed elsewhere [*R.A.E.*, A, ix, 14, 147].

PETCH (C. E.). **Spraying vs. Dusting.**—*13th Ann. Rept. Quebec Soc. Prot. Plants 1920–21*, pp. 68–72. Quebec, 1921. [Received 31st October 1922.]

The advantages of dusting and spraying are discussed, the information being based largely on the work of Sanders and Kelsall [*cf. R.A.E.*, A, x, 199] and adapted to Quebec conditions.

During 1920 a dust containing 45 per cent. sulphur, 47½ per cent. hydrated lime and 7½ per cent. calcium arsenate, applied on 19th July and 5th August proved more effective than spraying against the apple maggot [*Rhagoletis pomonella*, Walsh].

ZÜRCHER (A.). **El arceniato de plomo.** [Lead Arsenate.]—*Gaceta Rural*, xvi, no. 182, pp. 183–184. Buenos Aires, September 1922.

A spray containing 2 parts by weight of lead arsenate, 1 of copper sulphate, 1–2 of newly slaked lime and 100 of water is strongly recommended for its adhesive quality and resistance to heavy rains. It serves as a fungicide and prevents rabbits from feeding on the bark of trees, while if the lead arsenate is reduced to form 1 per cent., the solution will, if applied in September and October (in Argentina) to plants not intended for direct consumption, effectively check various insect pests, including bagworms.

CORREIA AFONSO (P.). **Tratamento das doenças das plantas pela pulverisação.** [The Treatment of Diseases and Pests of Plants by Spraying.]—*Bol. Agric.*, i, no. 3–4, pp. 243–254, 1 fig. Nova Goa, December 1919. [Received 31st October 1922.]

This article briefly describes simple modern methods for combating fungus and insect pests by spraying.

BEZZI (M.). **Un dittero nordamericano del gen.** ***Euxesta*** **stabilito in Italia.** [A North American Dipteron of the Genus *Euxesta* established in Italy.]—*Boll. Lab. Zool. gen. & agrar. R. Scuola sup. Agric.*, xv, pp. 223–225. Portici, 1921. [Received 31st October 1922.]

Diptera collected at Bologna include an Ortalid, *Euxesta nitidiventris*, Lw., an American fly that has been recorded as a crop pest. Other species of the genus have been observed as injurious to fruits and bulbs. It is probable that *E. nitidiventris* was imported with war shipments from America; it apparently thrives in Italy, as over 200 specimens were taken in the botanical garden at Bologna.

LA FACE (L.). **Osservazioni morfologiche e biologiche sull'** ***Antonina phragmitis*****, Marchal. (Hemiptera, Coccidae).** [Morphological and Biological Observations on *A. phragmitis*.]—*Boll. Lab. Zool. gen. & agrar. R. Scuola sup. Agric.*, xv, pp. 254-267, 10 figs. Portici, 1921. [Received 31st October 1922.]

The structural characters of the various stages of both sexes of *Antonina phragmitis*, Marchal, are described. This scale was found near Rome on *Phragmites communis* growing in damp situations. The infestation is not extensive, owing to the check exercised by Hymenopterous parasites. The females remain motionless, and the alate males have never been seen to fly. The species is viviparous. There are three generations a year, the first appearing in April-May, the second in July, and the third in August. Few of the hibernating females of this last generation escape parasitic enemies. The few that do so have great powers of resistance to adverse conditions, such as lack of moisture.

MASI (L.). **Le specie del genere** ***Dinarmus*** **(Hymenoptera—Chalcididae).** [The Species of the Genus *Dinarmus*.]—*Boll. Lab. Zool. gen. & agrar. R. Scuola sup. Agric.*, xv, pp. 268-278, 3 figs. Portici, 1921. [Received 31st October 1922.]

Notes are given on the more important characters of the various species of the Chalcid genus, *Dinarmus*. A key is given to the 11 species now known. New species described are :—*D. sauteri*, *D. silvestrii*, *D. ligusticus*, *D. lichtensteini* (parasitising *Mononychus punctum-album*), *D. cynipidis* (from galls of *Cynips tomentosa* and *C. argentea* in Italy) and *D. lesbiacus*. *D. pilosulus*, Thoms., and *D. acutus*, Thoms., are redescribed. The remaining species are *D. robustus*, Ms. (from galls of *Cynips coriaria* and *C. polycera* in Italy), *D. virescens*, Ms., and *D. dacicida*, Ms. The last-named parasitises the larvae of *Dacus oleae* in Italy, and has also been obtained there from galls of *Coleophora stephanii* on *Atriplex halimus*.

BEZZI (M.). **Due nuovi Tripaneidi (Dipt.) infestanti frutti di** ***Olea*** **nell' Africa del Sud.** [Two new Trypetids infesting the Fruits of *Olea* in South Africa.]—*Boll. Lab. Zool. gen. & agrar. R. Scuola sup. Agric.*, xv, pp. 292-301. Portici, 1921. [Received 31st October 1922.]

Dacus (*Chaetodacus*) *biguttulus*, sp. n., from *Olea laurifolia*, near Pretoria, and *Munromyia nudiseta*, gen. et sp. n., from *Olea foveolata* near King William's Town, are described.

GOWDEY (C. C.). **[Annual Report of the] Government Entomologist.**—*Ann. Rept. Jamaica Dept. Agric., 1921*, pp. 40-41. Kingston, 1922.

The pests recorded on coconuts during the year were *Chrysomphalus aonidum*, L. (Florida red scale), *Aleurodicus cocois*, Curt., and *Xyleborus* sp.

Banana suckers infested with *Cosmopolites sordidus*, Germ., have been planted in at least one district, and the danger of this practice is pointed out. Cacao was attacked by the Coccid, *Asterolecanium aureum*, Targ., and by *Heliothrips* (*Selenothrips*) *rubrocinctus*, Giard, which was very prevalent during the dry months of the year on

cacao, mango and avocado pear. Citrus pests included *Lepidosaphes beckii*, Newm., and *Chionaspis citri*, Comst.; the Aleurodid, *Aleurocanthus woglumi*, Ashby, which was rather less numerous than in the preceding year [*R.A.E.*, A, x, 166], was to some extent controlled by the red and brown fungi, which have become established, and by ant enemies. Minor pests were *Aleurocanthus spiniferus*, Quaint., and *Aleurothrixus floccosus*, Mask.

Tobacco was severely injured in two cases by *Protoparce sexta*, Br. Collection of the caterpillars having failed to reduce the numbers sufficiently, dusting with arsenicals was tried and quickly checked the infestation. The eggs are deposited singly on the lower surface of the leaves; incubation lasts 4–6 days, and the larval and pupal stages each about three weeks, the latter being spent in the soil. Aestivation occurs in the pupal stage. Cutworms were also numerous and were destroyed by poison baits.

Sugar-cane suffered from outbreaks of larvae of *Remigia punctularis*, Hb. (*Mocis repanda*, auct.), which are parasitised by a Tachinid, *Linnaemyia fulvicauda*, Walt., and an Ichneumonid (*Ophion*). A white grub, *Lachnosterna jamaicensis*, Arr., was recorded, and the moth borer, *Diatraea saccharivora*, Westw., was ubiquitous but not very injurious. Yams were attacked by the weevil, *Palaeopus costicollis*, Mshl. (*dioscoreae*, Pierce), and the Coccid, *Aspidiotus hartii*, Ckll.; beets by cutworms, crickets and the Chrysomelid, *Disonycha laevigata*, Jac.; tomatos by the Pentatomid, *Nezara marginata*, P. de B., and cucumbers by *Diabrotica theimei*, Baly (striped cucumber beetle). Geraniums were damaged by the Coccid, *Diaspis* (*Aulacaspis*) *pentagona*, Targ., and roses by *Chrysomphalus aonidum*, L., and the beetle, *Metachroma* sp.

Fruit pests included, on akee [*Blighia sapida*], the Coccid, *Pulvinaria cupaniae*, Ckll.; on naseberry [*Achras sapota*], *Saissetia hemisphaerica*, Targ.; on figs, *Tetrapriocera tridens*, F.; on mangos, *Anastrepha fraterculus*, Wied., and *Heliothrips rubrocinctus*, Giard, which was particularly abundant; on avocado pears, *Apate terebrans*, P. de B., and *H. rubrocinctus*; and on grapes, *Aphis illinoisensis*, Schim., and *Aspidiotus cydoniae*, Comst.

Household pests included *Eutermes ripperti*, Ramb., and Bostrychid borers, attacking the woodwork of buildings and furniture, ants, cockroaches and the skin beetle, *Attagenus gloriosae*, F. The Mediterranean flour moth [*Ephestia kühniella*] and *Tribolium confusum* attacked flour.

A report has been issued on the advisability of developing silk production as a cottage industry in Jamaica.

Subramania Iyer (T. V.). **Notes on the more important Insect Pests of Crops in the Mysore State. V–VII.**—*Jl. Mysore Agric. & Exptl. Union*, iv, no. 3, pp. 131–135. Bangalore, 1922.

Colemania sphenarioides, Bol. (Deccan grasshopper) has been recorded as a serious pest in Mysore, but has not appeared in numbers since 1912. *Hieroglyphus banian*, F. (rice grasshopper) has ceased to be a pest since 1913. *Aularches miliaris*, L., is confined to coffee estates, and is not a serious pest. *Brachytrypes portentosus*, Licht., damages the tender shoots of orange trees at night, hiding under dry leaves in the plant during the day. Various grasshoppers often appear in fairly large numbers after the rains in May or June, and are occasionally serious pests of cotton, *Sorghum*, gingelly [*Sesamum indicum*], etc. Their occurrence as a pest depends on the growth of weeds and

grass in surrounding fields. Bagging was found effective in a sorghum field, but poisoned baits of molasses, bran, arsenic, etc., were useless.

Sugar-cane was seriously damaged by termites in April, the soft internal tissues being completely destroyed, and the rind left intact. Various repellents were tried, which were only temporarily successful. Termites also attacked portions of grape vines just below the ground in a newly planted vineyard. The soil was dug out up to the roots and a mixture of phenyl and water poured on the stem and hollow around it, a paint of shellac dissolved in alcohol was applied and the earth put back again. Digging out the termitaria and the destruction of queens also proved effective. Occasionally young apple trees were found ringed by these insects.

Garlic was heavily attacked by a thrips, probably *Heliothrips indicus*, Bagn., which is an onion pest in other parts of India. Spraying with soap proved ineffective. *Thrips oryzae* was abundant in seed beds of rice. Water was allowed to stand in the plots to a depth of 3–4 in., and covered with a thin film of kerosene, after which the seedlings were disturbed by means of thin long sticks. The water was then drained off after 18 hours and after disturbing the plants a second time. Within a week the plants showed signs of recovery and were transplanted. Another thrips occurred on leaves and fruits of orange in March and April, causing the young fruits to drop off.

CLARKE (W. T.). **Ant Control on Ship Board.**—*Jl. Econ. Ent.*, xv, no. 5, pp. 329–333. Geneva, N.Y., October 1922.

A description is given of experiments undertaken against ants in ships on a steamship company's route through the Panama Canal to Havana and the United States Atlantic seaports. The species involved was *Monomorium (Parholcomyrmex) destructor*, Jord. Within the tropic of Cancer the ants increased in number and arsenical poisons were used, but as the atmosphere became more humid it was necessary to find a powder that was non-absorbent of moisture, odourless and non-irritant. Such a one consists of 6 parts by bulk of sodium fluoride, 2 parts of pyrethrum powder and 2 parts maize starch, and has proved an efficient insecticide. When cold weather was experienced the ants became dormant. Only one nest was found on the outward trip. The frequently recurring dormant periods seem to stimulate the ants to great activity when warm conditions occur. In view of the seriousness of the pest, it was recommended that infested ships should be fumigated with hydrocyanic acid gas, and that the stores should contain supplies of perforated tins, sponges and the ingredients necessary for insecticides. These recommendations were successfully acted upon.

McCOLLOCH (J. W.). **The Attraction of** *Chloridea obsoleta*, **Fabr., to the Corn Plant.**—*Jl. Econ. Ent.*, xv, no. 5, pp. 333–339, 5 tables. Geneva, N.Y., October 1922.

Further attention has been given to the study of the oviposition of *Heliothis (Chloridea) obsoleta*, F. (corn earworm) [*R.A.E.*, A, viii, 314]; the results of experiments prove that the odour of the silk of the maize plant may be an important factor in attracting the adult moths and should be further investigated. The work of previous authors on the study of the composition of the silk is reviewed, but they give no definite clue to the source of the odour. The author is of opinion that physiological and morphological studies would open the way for investigations

in the development of remedial measures. Many of the characters associated with earworm activities may be modified by careful selection, and varietal studies of maize may reveal the existence of strains lacking the characters attractive to the moths.

DE ONG (E. R.). **The Relation of Hard and Alkaline Waters to the Preparation and Dilution of Sprays and Dips.**—*Jl. Econ. Ent.*, xv, no. 5, pp. 339–345, 4 tables. Geneva, N.Y., October 1922.

The salts soluble in water are recognised as a source of danger in the preparation or dilution of sprays and dips. In the first place, chemical reactions may neutralise the efficiency of the materials or produce dangerous compounds. For example the use of alkaline or saline waters with acid (standard) lead arsenate may produce a soluble arsenical dangerous to foliage. Secondly, physical reactions may occur, such as the breaking up of oil or cresol emulsions in hard waters, which free the chemicals held in suspension and destroy the value of the mixture. Softening hard water with chemicals is not altogether successful. A water-softening apparatus with a capacity sufficient for supplying a spray outfit may be installed for a few hundred dollars. Where practicable, dusting materials should be used instead of liquid sprays, as the user is independent of the type of water found locally. A satisfactory solution of the problem is the substitution of basic lead arsenate for the acid standard type, and arsenical dips instead of cresol preparations. Formulae are given for making oil emulsions with waters of varying degrees of hardness.

WARREN (D. C.). **Relation of Moisture to Ingestion of Poison by the Cotton Boll Weevil.**—*Jl. Econ. Ent.*, xv, no. 5, pp. 345–349, 3 tables. Geneva, N.Y., October 1922.

In view of the difference of opinion as to whether moisture is essential for the cotton boll weevil [*Anthonomus grandis*] to ingest poison, further experiments are here described. In 1920, 72 hours after the poison (calcium arsenate) had been applied there was a mortality of 45 per cent. amongst weevils feeding when there was no dew, although they remained on the poisoned plant a much shorter period than those feeding when dew was present, which suffered a mortality of 35 per cent. In 1921 the mortality of the former was 85 per cent. for a period of 96 hours, with 71 per cent. for the latter. From these results and those of other authors it is clear that weevils are poisoned by ingestion of poison with their food, rather than by drinking the poisoned dew. This conclusion has nothing to do with the time of day when the poison is applied, as it is established that better results are obtained from applying poison while the plant is wet with dew.

HAYES (W. P.). **Observations on Insects attacking Sorghums.**—*Jl. Econ. Ent.*, xv, no. 5, pp. 349–356, 1 table. Geneva, N.Y., October 1922.

The sorghum crop in Kansas is valued at about £10,000,000, and is on the whole remarkably free from insect pests. *Celama* (*Nola*) *sorghiella*, Riley (sorghum webworm) was the most serious pest of this crop in 1921. Little is known of the habits of this moth; it probably hibernates in the larval stage in Kansas. There are possibly two or more broods and an undetermined plant that maintains a

supply of food until the sorghum heads appear. It is reported that farmers were unable to harvest their crops owing to the urticarial rash produced by contact with the larva.

Several fields in the western part of the State were ruined by *Aphis maidis*, Fitch (corn leaf aphis). Experiments to prove the effect of this injury on the germinative powers of the grain show a reduction of nearly 4 per cent. in the vitality of the seeds.

During 1921 *Heliothis* (*Chloridea*) *obsoleta*, F. (corn earworm) was unusually abundant on *Sorghum*, feeding first on the leaves and then on the green heads. *Leptoglossus zonatus*, Dall., was a minor pest. *Sitotroga cerealella*, Oliv. (Angoumois grain moth) also caused considerable damage to *Sorghum*, and much loss is expected in the stored crop.

Observations were made on the susceptibility of milo to injury by *Blissus leucopterus*, Say (chinch bug), but of 24 varieties only 3 showed stunted plants. *Toxoptera graminum*, Rond. (green bug) occasionally injures Sudan grass as well as other varieties of sorghum.

One of the most injurious pest of kafir corn is *Solenopsis molesta*, Say, and some observations on the mating habits of this ant are given. *Pheidole* sp. did some damage to planted *Sorghum* as well as to maize seeds during May and early June; the damage is similar to that of *S. molesta*. *Hylemyia cilicrura*, Rd. (*Phorbia fusciceps*, Zett.) (seed corn maggot) was found seriously damaging planted kafir corn seed. One test of repellents with tobacco compounds, using nicotine resinate, tobacco oil, and nicotine sulphate (40 per cent.) on commercial white maize, indicates that they may be of some value. The nicotine sulphate, which had a strong odour at the end of the test, had not injured germination, and repelled the larvae, but further tests are desirable.

WADLEY (F. M.). U.S. Bur. Ent. **Control of the Strawberry Leaf-roller in the Missouri Valley.**—*Jl. Econ. Ent.*, xv, no. 5, pp. 356–360. Geneva, N.Y., October 1922.

The life-cycle of *Ancylis comptana*, Fröhl. (strawberry leaf-roller) in Kansas in summer is 6 days for the egg stage, 22 for the larval and 7 for the pupal. The over-wintering larva pupates early in the spring, the adults emerging during April. It is possible that there are four generations, but that some of the last larvae of the third generation hibernate before pupating and that in long seasons a fifth generation may develop. Adults of the first generation appear by 1st June, and those of the second about 10th July, the former being usually the more injurious. Remedial measures recommended are spraying with lead arsenate when the moth threatens to appear in injurious numbers. One or two applications as the plants begin blossoming will reduce the numbers of the first generation. If injury continues after harvest, further sprays should be applied. There is little advantage in spraying at intervals of less than two weeks in dry weather in summer and autumn, but in wet weather shorter intervals are better. Spraying is not necessary or profitable when leaf-rollers are scarce.

CARTWRIGHT (W. B.). U.S. Bur. Ent. **Host Plant Selection by Hessian Fly** (*Phytophaga destructor*, **Say**).—*Jl. Econ. Ent.*, xv, no. 5, pp. 360–363, 2 plates, 5 tables. Geneva, N.Y., October 1922.

In the autumn of 1921 two sowings of wheat, rye, barley and oats were made to determine the relative attractiveness of these cereals

to the adults of *Mayetiola* (*Phytophaga*) *destructor*, Say (Hessian fly) for oviposition, and to obtain comparative data on larval infestation. Accumulated egg counts from a constant number of plants showed that 73·4 per cent. were deposited on wheat, 14·5 per cent. on rye, 11·8 per cent. on barley, and 0·3 per cent. on oats. Resultant larval infestation from the autumn oviposition was primarily manifest in wheat and barley; rye was scantily infested, and oats not at all. The percentages of plants infested from the two series of plots were for wheat 96 and 98, for barley 64 and 62 and for rye 6 and 8 respectively.

CAMPBELL (R. E.). U.S. Bur. Ent. **Injury to Bell Peppers by** *Blapstinus coronadensis*, **Blaisd., and** *B. dilatatus*.—*Jl. Econ. Ent.*, xv, no. 5, pp. 363–365. Geneva, N.Y., October 1922.

In September 1921 a field of young bell peppers [*Capsicum grossum*] were damaged by *Blapstinus coronadensis* and *B. dilatatus*. The injury varied from a hole or two in the epidermis to the complete girdling of the stem for an inch or more, and in severe cases the plant was broken off. The field most seriously damaged had been cultivated for five years, and was opposite a lemon orchard separated by a farm road, the greatest damage occurring near this road. Experiments showed that wet sprays and flooding measures were valueless, but that dry, dusty material had a deterrent effect. When a bait of bran, shorts and Paris green was used for cutworms in 1911, many of these beetles were found dead beside the bait.

SCHWING (E. A.) & HARTUNG (W. J.). **Utilisation of Systematic Observations on Beet Leafhopper** (*Eutettix tenella*, **Baker**) **and Curly Leaf of Sugar Beets.**—*Jl. Econ. Ent.*, xv, no. 5, pp. 365–368. Geneva, N.Y., October 1922.

Information is required by sugar companies as to the numbers of beet leafhoppers (*Eutettix tenella*, Baker) present during the spring invasion and also, at frequent intervals, the extent and progress of curly leaf which this insect transmits; and the best method of obtaining and tabulating the data needed is indicated.

During 1920 the number of adults in the beet fields of the Salinas Valley remained almost constant from the time of the invasion early in May until the second brood adults made their appearance at the end of June. Nymphs began to appear early in June and increased as the month progressed. Almost the same conditions prevailed in 1921. Three fields were tested during 1920 to show the effect of the time of planting. One planted on 1st April was blighted by the 26th June, and a crop of less than a ton per acre was harvested. Beets planted in January in the same field averaged 8 tons per acre. A second field planted the end of March showed 100 per cent. blight by 24th July and yielded 3·1 tons per acre. The third was planted in February and did not show 100 per cent. blight until 20th August, the crop being ready to harvest before this date. In foggy districts more leafhoppers were present and a higher percentage of curly leaf occurred in early planted fields than in other fields planted after the invasion of the pest. March plantings showed 80 per cent. curly leaf on 23rd July, while beet seeds that germinated after 1st May showed only 3 per cent. blight on 5th August. At Santa Rita 60 per cent. of the early planted beets were blighted compared with 3 per cent. in an area replanted on account of the disease in the same field.

Growers require to know if a profitable crop of sugar beet can be grown where the leafhopper is present and if it is better to allow infested fields to complete their growth or to plant some other crop. Systematic observations under semi-arid conditions show that beets planted before March with proper cultural methods and soil moisture will produce a fair yield in blight years. If beets have not been thinned or only just been thinned when the adults appear, the possibility of a crop is doubtful; in fact a failure is almost certain if one leafhopper to 20 beets is present. Even if they have been thinned and possess not more than 16 leaves each and one insect to 20 beets, success is doubtful, but they had better be left to complete their growth if the success of another crop planted at this time is also doubtful. In fog districts replanting may be resorted to when the first planting becomes badly blighted early in the season.

PHILLIPS (E. F.). U.S. Bur. Ent. **The Effect of Activity on the Length of Life of Honeybees.**—*Jl. Econ. Ent.*, xv, no. 5, pp. 368–371, 1 table. Geneva, N.Y., October 1922.

Experiments under varying conditions on three lots of bees without food are described. The first was placed in a completely dark room, and the last bee died on the fourth day; the second was placed in a room with constant light, which caused excessive activity as long as the bees were capable of it, the last bee dying in 42 hours; the third was kept in a room with diffuse light, the last bee dying 51 hours after the beginning of the experiment. It appears that rapidity of death by starvation occurs in direct proportion to the work the bees have to do, and that when death from starvation occurs rapidly, there is still a reserve of food that has not been depleted.

QUAYLE (H. J.). **Dusting versus Spraying for the Codling Moth in Walnuts.**—*Jl. Econ. Ent.*, xv, no. 5, pp. 371–372. Geneva, N.Y., October 1922.

During the past three years a considerable acreage of walnuts in Southern California has been dusted for codling moth [*Cydia pomonella*, L.], and it has been found that only basic or neutral lead arsenate can be used with safety. A tabular summary is given of results of experiments to compare spraying with dusting from which it appears that spraying was the more effective.

FROST (S. W.). **Two injurious Fruit Mites in Pennsylvania.**—*Jl. Econ. Ent.*, xv, no. 5, p. 372, 1 plate. Geneva, N.Y., October 1922.

Paratetranychus pilosus, C. & F. (European plum mite) has been found injurious on fruit trees in Pennsylvania, having been previously recorded as a pest chiefly on apple and plum and sometimes on cherry and peach. *Phyllocoptes cornutus*, Banks (silver-leaf mite) has also been abundant on peach. Both species produce characteristic injury and have a tendency to flatten the leaves. The former causes the foliage to turn yellowish and later bronze, and the latter silvery and later leaden in colour.

PATCH (E. M.). **Aroostook Potato Insects.**—*Jl. Econ. Ent.*, xv, no. 5, pp. 372–373. Geneva, N.Y., October 1922.

The following insects were collected from potatoes in Maine in 1921: *Cosmopepla carnifex*, *Canthophorus cinctus*, *Adelphocoris rapidus*, *Poecilocapsus lineatus*, *Lygus pratensis*, *Philaenus lineatus*, *P. spumarius*,

Clastoptera proteus, Ceresa basalis, Platymetopius acutus, Acocephalus nervosus (*striatus*), *Phlepsius apertus, Graphocephala coccinea* and *Agallia sanguinolenta*. None of them, however, except *L. pratensis,* were abundant enough to be of serious economic importance. *Empoasca mali* was conspicuous by its absence. The following predacious damsel-bugs were present: *Nabis roseipennis, N. ferus, N. limbatus, N. subcoleoptratus,* and *Pagasa fusca. Euschistus tristigma* and *Pentatoma juniperina* were found feeding on potato plants in 1906.

LIST (G. M.). **Mexican Bean Beetle.**—*Jl. Econ. Ent.*, xv, no. 5, p. 373. Geneva, N.Y., October 1922.

The first official record of *Epilachna corrupta*, Mull. (Mexican bean beetle) in Utah is reported. This may be the most westerly infestation of this Coccinellid.

FISHER (A. K.). **The Value of Carbon Bisulphide in combating Tent Caterpillars and Mosquitoes.**—*Jl. Econ. Ent.*, xv, no. 5, p. 373. Geneva, N.Y., October 1922.

The following use of carbon bisulphide for killing tent caterpillars [*Malacosoma*] is recommended. A piece of raw cotton, well saturated with carbon bisulphide should be placed on the blunt point of a long pole. This should be pushed into the web and, by turning the pole, be left inside, where the fumes will almost immediately kill all the occupants. Droppings from fire torches, which are commonly used for this purpose, sometimes start ground fires, while the tree is often injured by the heat.

B[RITTON] (W. E.). **Outbreak of the Birch Skeletonizer.**—*Jl. Econ. Ent.*, xv, no. 5, p. 374. Geneva, N.Y., October 1922.

Bucculatrix canadensisella, Chambers (birch skeletoniser) was abundant in Connecticut in 1922 on *Betula populifolia*. Other species of birch were attacked, but not injured to the same extent.

B[RITTON] (W. E.). **Apple and Thorn Skeletonizer.**—*Jl. Econ. Ent.*, xv, no. 5, p. 374. Geneva, N.Y., October 1922.

Hemerophila pariana, Clerck (apple and thorn skeletoniser) attracted much attention in 1922 and appears to be distributed all over Connecticut. The injury to sprayed orchards is slight.

EVANS (H. J.). **Controlling Cabbage Root-maggots.**—*Amer. Agr.*, cix, no. 17, p. 311, 1 fig., 1922. (Abstract in *Expt. Sta. Record*, xlvii, no. 4, p. 361. Washington, D.C., September 1922.) [Received 29th November 1922.]

Through the use of corrosive sublimate, applied 8th May at the rate of 1 oz. powder to 10 [U.S.] gals. water, 98 per cent. of the plants were saved from the attacks of cabbage root-maggot [*Phorbia brassicae*] on one farm in New York, and 95 per cent. on another farm in the same locality, whereas 69 and 74 per cent. of the plants, respectively, were destroyed on untreated parts of the fields. Very poor results were obtained, however, when the solution was applied after 15th May. Where the cabbage seed beds remain unscreened, this fly may be almost entirely controlled by applying the solution when the plants are 2½ or 3 ins. high, or about the first week in May. One application proved insufficient, and 4 at intervals of a week are not too many.

SMITH (R. H.). **The Eelworm Disease of Red Clover.**—*Idaho Agric. Expt. Sta.*, Bull. 130, 14 pp., 6 figs. Moscow, Ida., March 1922. [Received 1st November 1922.]

The Nematode, *Tylenchus dipsaci*, Kuhn (stem and bulb eelworm) has been causing much loss in Idaho by its attacks on red clover, which is thereby rotted at the crowns, particularly during cool weather. Eggs are deposited in enormous numbers in the tissues of the plants and are very resistant to drought, changes of temperature and the influence of chemicals. The stem of the plant is entered at the surface of the soil. As the plants mature most of the Nematodes are said to migrate back into the soil, but the eggs and many immature forms dry up in the plants above-ground and again become active under favourable conditions of heat and moisture.

There appear to be several biological strains, more or less specialised for various food-plants, such as red clover, lucerne, onion, strawberry or rye. The chief method of dissemination is by means of irrigation. As waste water frequently drains back into irrigation ditches, it is probable that all irrigation water in infested regions is more or less contaminated. Other methods of dissemination are in particles of dust carried by the wind, in straw, seed and manure, and on implements and the feet of animals.

The application of chemical substances to infested soil is not practicable under farming conditions in Idaho. The most dependable and practical method of control is crop rotation. Red clover fields should be ploughed under not later than the third autumn or winter after sowing, or sooner if they become badly infested. No experiments have been made on rotation in Idaho, but it is not considered advisable to sow red clover on a field until it has grown other crops for at least two years. Too much irrigation, or lack of drainage, tends to increase infestation.

On lucerne, infestation is most noticeable during spring, the plants making a slow, stunted growth, and the buds being swollen, distorted and discoloured. On strawberry plants, the stems, petioles and runners become enlarged and distorted, while the tops of the flowering stems, petioles and leaves are dwarfed or abnormally shaped.

SMITH (R. H.). **The Important Orchard Insects of Idaho and their Control.**—*Idaho Agric. Expt. Sta.*, Circ. 23, 8 pp. Moscow, Ida., March 1922. [Received 1st November 1922.]

The insects dealt with include *Eriophyes pyri*, Pag. (blister mite), *Aspidiotus perniciosus*, Comst. (San José scale), *Anarsia lineatella*, Z. (peach twig borer), *Eriosoma lanigerum*, Hausm. (woolly apple aphis), *Aphis pomi*, DeG. (green apple aphis), *Anuraphis roseus*, Baker (rosy apple aphis), *Myzus cerasi*, F. (black cherry aphis), *M. persicae*, Sulz., *Anuraphis helichrysi*, Kalt., *A. cardui*, L., *Phorodon humuli*, Schr., *Anuraphis persicae-niger*, Smith (black peach aphis), *Tortrix* (*Archips*) *argyrospila*, Wlk. (fruit-tree leaf-roller), and *Cydia* (*Carpocapsa*) *pomonella*, L. (codling moth). Brief notes are given on the remedial measures for each, and instructions are given in the use of the commoner sprays and spreaders.

SMITH (R. H.). **Spider Mites affecting Orchard and Garden Fruits.**—*Idaho Agric. Expt. Sta.*, Circ. 25, 8 pp., 3 figs. Moscow, Ida., March 1922. [Received 1st November 1922.]

There are three species of mites injuring fruit in Idaho. *Tetranychus telarius*, L. (red spider) is the commonest and most destructive on

fruit, vegetables, flowers, shrubs and trees. Clean cultivation of the soil in late autumn and early spring should be practised. Trees should be liberally watered during the summer. For orchard trees, a lime-sulphur 1 : 50 spray, a sulphur spray or a force spray of soapy water, is recommended. *Bryobia pratensis*, Garm. (brown mite) is generally a pest of orchard trees or of clover. A dormant lime-sulphur spray is recommended, with sulphur sprays later in the season. *Paratetranychus pilosus*, C. & F. (European red mite) is strictly an orchard pest, apples being particularly infested. Oil sprays were found to give better results than sulphur. After the foliage is out, the most satisfactory practice is to add liquid lime-sulphur to the first cover spray for codling moth [*Cydia pomonella*, L.] at the rate of 1 : 50, using caseinate as a spreader.

SMITH (R. H.). **Aphids attacking Stone Fruits in Idaho and Methods for their Control.**—*Idaho Agric. Expt. Sta.*, Circ. 26, 11 pp., 9 figs. Moscow, Ida., March 1922. [Received 1st November 1922.]

A brief account is given of the life-history and habits of the Aphids attacking stone fruits in Idaho. The best remedy for all of these, except *Anuraphis persicae-niger* (black peach aphis), is to destroy the stem-mothers before the blossom buds open in early spring, by means of adding nicotine-sulphate to the usual dormant application of lime-sulphur. Partial control of *A. cardui*, L., and *Myzus cerasi*, F., may be obtained with nicotine-sulphate sprays after the leaves have developed, but these are of little use against the leaf-curling Aphids.

SMITH (R. H.). **The Root Maggot of Radishes, Turnips, Cabbage and related Vegetables.**—*Idaho Agric. Expt. Sta.*, Circ. 24, 3 pp., 2 figs. Moscow, Ida., March 1922. [Received 1st November 1922.]

A brief account is given of *Phorbia brassicae*, Bch. The remedial measures suggested are ploughing in the autumn to destroy the puparia, alternating with some other crop, planting either early or late to avoid summer infestation, and the use of fertilisers. Treatments of the soil are also discussed.

LONGLEY (L. E.). **The Codlin Moth in the Payette Valley.**—*Idaho Agric. Expt. Sta.*, Bull. 124, 27 pp., 4 plates, 5 figs. Moscow, Ida., June 1921. [Received 1st November 1922.]

A detailed study of the codling moth [*Cydia pomonella*, L.] in the Payette Valley, Idaho, was made in 1920 and is described at length. The emergence of the first generation was unusually prolonged, probably owing to low temperatures during May, and extended until mid-July. In such a season it is found necessary to apply five sprays, one being the calyx spray, two for the first generation and two for the second. Spraying frequently fails to control the moth because in years of very small crops little or no spraying is done, and the over-wintering larvae consequently increase, causing a heavy infestation in the following season. Spraying outfits are often lacking, and too little poison is often used. The development of the insect must be carefully followed if the sprays are to be applied at the time when they will be most effective.

GOSSARD (H. A.) & PARKS (T. H.). **Hessian Fly Control in 1921 and 1922.**—*Mthly. Bull. Ohio Agric. Expt. Sta.*, vii, no. 9–10, pp. 160–167, 1 map. Wooster, Ohio, September–October 1922.

In consequence of a co-operative effort in 1920 to prevent a heavy infestation of Hessian fly [*Mayetiola destructor*, Say] in Ohio [*R.A.E.*, A, ix, 245], the wheat survey made just before the harvest of 1921 showed an average infestation of 17 per cent., against the 44 per cent. found in 1920. On account of the unusually late emergence of the fly in 1920, however, there was still danger over considerable areas in 1921. The fly-free dates for sowing wheat were again carefully planned and observed, and the survey in June 1922 revealed infestation amounting to less than 6 per cent. over the south-eastern parts of the State. The northern counties will again require careful planning for sowing dates. The figures for a number of counties are recorded, and show striking contrasts of infestation between fields sown before and after the chosen dates.

NEWMAN (H. E.). **Leaf Roller in Neglected Orchards.**—*Better Fruit*, xvii, no. 1, p. 14. Portland, Oregon, July 1922.

The fruit-tree leaf-roller [*Tortrix argyrospila*] threatens to become one of the most serious insect pests of deciduous fruits in the north-western United States. Fruit-growers in lightly infested districts are urged to undertake remedial measures immediately. Tests made in Washington State indicate that the ordinary sprays for codling moth [*Cydia pomonella*, L.] may be a factor in holding the leaf-roller in check if consistently applied to all orchards in the district. Laboratory tests have shown that a spray of 4–8 lb. lead arsenate in 100 U.S. gals. water kills 90 per cent. of larvae 2 or 3 days old. In neglected orchards, or in places where the pest is well established, stronger or more frequent lead arsenate sprays, or a dormant spray of oil will probably be necessary [*cf. R.A.E.*, A, ix, 164, 222, etc.].

LATHROP (F. H.). **Ousting the Prune Root Borer.**—*Better Fruit*, xvii, no. 2, pp. 7–8, 4 figs. Portland, Oregon, August 1922.

Much of the information in this paper on the prune root borer [*Aegeria opalescens*, Edw.] has been previously noticed [*R.A.E.*, A, ix, 163]. The use of paradichlorobenzene, which has proved successful elsewhere [*R.A.E.*, A, viii, 189, etc.], is being tried under Oregon conditions. The soil temperature must be 55° F. or more for at least 10 days after the material is applied, and the soil must be reasonably dry during that period. The best time for application is from August 14th to 20th. As the results of this treatment are still rather uncertain, naphthaline whitewash may be preferred. For this, 8 lb. quicklime is slaked and ¼ lb. copper sulphate added, after being dissolved in water for a day or two. When cool, ½ lb. glue or casein, dissolved in water is put in; 1 lb. flake naphthaline is then added, with water to form a thick paste. The application of such a wash has been described [*R.A.E.*, A, ix, 163]. For young trees, a protector of roofing paper, inside which flake naphthaline is sprinkled, is described.

MCKEOWN (K. C.). **Insects in Dried Fruits. Experiments in Sterilisation for their Control.**—*Agric. Gaz. N.S.W.*, xxxiii, no. 9, pp. 642–646. Sydney, September 1922.

Experiments for the destruction of insects in dried fruits have now been carried out on a commercial scale with a large dehydrating plant,

which is described. The fruits tested were dried nectarines, prunes, currants and sultanas of the previous season, all heavily infested with *Plodia interpunctella* (Indian meal moth) in all stages of development. The most effective temperature proved to be 145–146° F. At this heat, maintained for 10–15 minutes, all stages of the insect are destroyed. The importance of keeping packing sheds and drying grounds clean, so that they will not act as breeding places for the moths, is pointed out.

McCarthy (T.). **A Useful Scale-eating Moth.**—*Agric. Gaz. N.S.W.*, xxxiii, no. 9 p. 646. Sydney, September 1922.

Citrus trees infested with red scale [*Chrysomphalus aurantii*] or other Coccids, frequently show the presence of certain lumps that might easily be mistaken for very large Coccids, but which are really the cocoons of the scale-eating moth, *Eublemma* (*Thalpochares*) *coccophaga*. The eggs are laid among the Coccids on infested trees, and the larvae feed on the scales, under a protective covering constructed of silk. Pupation occurs in a cocoon attached to the twigs, and these should be preserved.

Orozco (E.). **Insectos útiles.** [Useful Insects.]—*Rev. Agric.*, vii, no. 5, p. 266, 1 fig. San Jacinto, Mexico, September 1922.

A beetle, *Blaps communis*, is recorded as a useful predator on many insects injurious to agriculture in Mexico.*

Lehmann (K. B.). **Bestehen gerechtfertigte hygienische Bedenken gegen die Verwendung von Blausäure und blausäurehaltigen Mitteln (Zyklon) als Vernichtungsmittel für Ungeziefer im grossen (Entwesung).** [Are hygienic Scruples justified against the Use of Hydrocyanic Acid Gas and Substances incorporating it (Zyklon) as Destroyers of Vermin on a large Scale.]—*Münchener med. Wochenschr.*, no. 53, pp. 1517–1520. Munich, 1920. [Received 2nd November 1922.]

The conclusion reached is that fumigation with hydrocyanic acid gas is quite permissible provided that the proper precautions are carefully observed. Zyklon [$CNC^{00}CH_3$], a derivative of hydrocyanic acid gas, is much safer because if only 1 per cent. of the quantity required for disinfection is present, the room is untenantable owing to the powerful irritant action on the mucous membranes of the chlorocarbonic acid acid ester contained in it.

Rasch (W.). **Die Bedeutung der Blausäure und ihrer Derivate für die Schädlingsbekämpfung.** [The Importance of Hydrocyanic Acid Gas and its Derivatives in combating Pests.]—*Desinfektion*, vi, no. 5–6, pp. 153–212. Berlin, May–June 1921. [Received 2nd November 1922.]

An account is given of the past history of fumigation with hydrocyanic acid gas and the present position as regards the use of this substance and its derivatives. It is urged that thorough research is necessary to secure to them the position their efficiency warrants. A bibliography of 230 references is a special feature, as no such list has been previously published.

* [The insect figured is an *Eleodes* (not *communis*, Blaird.), a purely phytophagous genus; probably the predator is really a *Calosoma*.—Ed.]

RASCH (W.). **Wege und Ziele der Schädlingsbekämpfung.** [The Direction and Aims of the Work against injurious Organisms.]—*Angew. Botanik*, iv, no. 3, pp. 116–120. [*Sine loco.*] 1922.

The lines along which research work should be directed in elucidating problems of applied entomology are discussed.

RASCH (W.). **Was ist bei Blausäuredurchgasungen zu beachten und wie weit kann eine Blausäuredurchgasung durch andere Massnahmen ersetzt werden.** [What Points must be observed in Fumigation with Hydrocyanic Acid Gas and to what Extent can such Fumigation be replaced by other Measures?]—Reprint from *Der Müller*, 2 pp. [*Sine loco*, n.d.] [Received 2nd November 1922.]

The various points requiring attention in fumigating flour mills with hydrocyanic acid gas are discussed. Alternative methods of fumigation with sulphur and chloropicrin, the use of heat, and, in the case of the meal moth [*Ephestia kühniella*], biological control by a Braconid [*Habrobracon brevicornis*] [*R.A.E.*, A, x, 566] are noticed. Sulphur fumigation is costly and of limited local effect. Chloropicrin is useful for work on a small scale, but it attacks metals. Heat is almost ruled out owing to the high cost of fuel and of the necessary apparatus. As regards control by *H. brevicornis*, difficulties of breeding this parasite have not yet been overcome.

GHESQUIÈRE (J.). **Note au sujet des moyens de lutte à employer contre la chenille des capsules,** *Heliothis obsoleta* **(bollworm) et les chenilles épineuses,** *Earias biplaga, E. insulana* **(spiny bollworm).**—Reprint from *Bull. administ. & commercial Congo belge*, 3 pp. [*Sine loco.*] 1922. [Received 4th November 1922.]

In some parts of the Belgian Congo, *Heliothis obsoleta* is never found to do serious injury to cotton grown on the present native system, the reason being that each small area planted with cotton is surrounded by a belt of maize, which is also sown along the paths and on any waste patch between cotton areas. This acts as an excellent trap crop for *H. obsoleta* and for *Earias* spp., which oviposit for preference on the maize. The native women gather the ears of maize every day before they are mature, while the grains are still white, for cooking purposes; and in this way destroy numbers of eggs and young larvae. This is practically the trap-crop method that has proved so successful in the United States [*R.A.E.*, A, ix, 281]. The European, on the other hand, grows his maize at the beginning of the rainy season and gathers it just when the cotton, planted later, is forming its first capsules. The cotton harvest is not over before the next rains, and thus *H. obsoleta* finds sufficient nourishment all the year round to enable it to appear abundantly in the cotton fields.

The natives should be encouraged to watch their maize for the presence of bollworms, while the European growers should grow their maize along with their cotton. By the practice of "topping" the cotton plants, growth is improved and many bollworms, Aphids, and Capsids infesting the young shoots will be destroyed. The usual methods of clearing up the fields immediately the crop is gathered are advised, and it is suggested that early-maturing varieties should be grown. Wagtails should be encouraged, as they live almost exclusively on insect larvae. Parasites of *H. obsoleta*, which have

not yet been determined, include a Chalcid egg parasite, a Nematode and a Proctotrupid, parasitic on the larvae, and a Braconid and a Mutillid, parasitic on the pupae.

The use of lead arsenate or Paris green sprays is only recommended in particular instances and should not be attempted in native plantations.

Ghesquière (J.). **Contribution à l'étude éthologique des** *Laemophloeus*.—*Rev. Zool. africaine*, x, no. 2, pp. 216–218. Brussels, 1922.

The Cucujid, *Laemophloeus janeti*, Grouv., is common in the Belgian Congo among grain pests in stored rice, cotton seed, or flour, in coconuts attacked by the Anthribid, *Araecerus fasciculatus*, DeG., and in cacao pods mined by larvae of *Characoma stictigrapha*, Hmp., and *Mussidia nigrivenella*, Rag. The adults remain confined to their habitat during the day; at sundown they take flight and invade any place where the products they prefer are to be found, frequently biting any persons working there. The larvae are coprophagous and scavengers, and were always found in the excrement or shed skins of Lepidopterous larvae, while the adults are purely carnivorous. It is quite likely, however, that the species may become polyphagous under conditions of shortage of normal food.

Feytaud (J.). **Le Doryphore** (*Leptinotarsa decemlineata*, **Say**), **Chrysomèle nuisible à la pomme de terre.**—*Rev. Zool. agric. & app.*, xxi, nos. 8–10, pp. 121–168, 1 plate, 13 figs., August–October 1922; also as spec. no., 48 pp., 1 plate, 13 figs. Bordeaux, August 1922.

A general account is given of the life-history and habits of *Leptinotarsa decemlineata*, Say, and its relations to climate and temperature are discussed. The natural enemies that may be expected to reduce its numbers to some extent are enumerated, and maps show the extension and spread of the infestation in America, in Europe, and in Gironde. The campaign that has been undertaken in Gironde since the discovery of the pest is described at length [*R.A.E.*, A, x, 514, 537, 575, 584]. It is remarked that soil disinfection is a remedy that has still to be tried in this connection.

The legislation that has been passed in connection with *L. decemlineata* in France is quoted [*R.A.E.*, A, x, 536].

Feytaud (J.). **Le Doryphore de la Pomme de Terre en Gironde.**—Reprint from *C.R. Acad. Agric. France*, 4 pp. [Paris] 1922.

The information contained in this paper has been noticed previously [*R.A.E.*, A, x, 575].

Caesar (L.). **The Cabbage Maggot.**—*Ontario Dept. Agric.*, Bull. 289, 39 pp., 15 figs. Toronto, August 1922.

An account is given of *Phorbia brassicae*, Bch. (cabbage maggot) as occurring on cabbages, cauliflowers, radishes and turnips, in Ontario. Many experiments in the use of mercury bichloride as a remedy are recorded in detail, the results of which have confirmed those previously noticed [*R.A.E.*, A, ix, 372, etc.]. While two applications are

recommended, the best times for further applications, when necessary, are discussed, and instructions for the best methods of preparing and applying the poison, with estimates of cost, etc., are included.

PETERSON (A.). **Paradichlorobenzene (p-c-benzene) for controlling the Peach Tree Borer.**—*New Jersey Agric. Expt. Sta.*, Circ. 126, 12 pp., 6 figs. New Brunswick, N. J., August 1921. [Received 6th November 1922.]

The bulk of the information contained in this circular has previously been noticed [*R.A.E.*, A, viii, 189, etc.]. The best time for the application of paradichlorobenzene against the peach-tree borer [*Aegeria exitiosa*, Say] in New Jersey is 15th September or immediately after for the northern half of the State and 1st October or following days for the southern half. When no autumn treatment has been given, a spring application should be made in May, and should be followed by an autumn treatment.

FLINT (W. P.) & CHANDLER (S. C.). **The Peach Borer and Methods of Control.**—*Illinois Nat. Hist. Survey*, Ent. Circ. 8, 11 pp., 7 figs. Urbana, Ill., 1st March 1922. [Received 6th November 1922.]

The results of experiments with paradichlorobenzene against *Aegeria exitiosa*, Say (peach borer) in Illinois are recorded. The best time for treatment in southern Illinois is from 25th September to 25th October, and in the north from 20th September to 20th October. If treatment is given in the spring, it should be from 1st to 20th May. The soil temperature 3 ins. below the surface should be at least 60° F. It seems possible under Illinois conditions to treat without injury any tree more than one year old, instead of the usual condition of six years or more, but further experiments are required on these lines.

BROWN (H. B.) & O'KELLY (J. F.). **Cotton Experiments.**—*Mississippi Agric. Expt. Sta.*, Bull. 205, 15 pp., 2 figs. Agric. Coll., Miss., December 1921. [Received 6th November 1922.]

Boll weevils [*Anthonomus grandis*] appeared in the College cotton fields in Mississippi as early as 13th June in 1921. On 24th June the ordinary calcium arsenate dust spray was applied, but there was hardly sufficient dew to make this successful. This poison was afterwards applied in a water solution, while a further mixture was made of 1 lb. calcium arsenate, 1 U.S. gal. black strap molasses and 1 U.S. gal. water. The latter was more expensive and troublesome to handle than the former, but seemed to adhere better and was sometimes visible when showers had washed off the other poisons.

CORBETT (G. H.) & PONNIAH (D.). **Preliminary Notes on the Rubber Flower Geometrid** (*Hemithea costipunctata*, **Moore**).—*Malayan Agric. Jl.*, x, no. 4, pp. 100–105, 4 figs., 3 tables. Kuala Lumpur, April 1922.

Hemithea costipunctata, Moore, has been found on rubber inflorescences at Kuala Lumpur and is probably present throughout Malaya. The larvae feed chiefly on the unopened blossoms, but in captivity they will also feed on open flowers. The moths are inactive by day, and mating occurs at night. The female oviposits four or five days

after emergence and lives about a week. The maximum number of eggs laid by one female was 69, and they are usually deposited singly on the unopened blossoms and flower-stalks. The average incubation period is three days. The colour of the larvae resembles its environment and its attitude prevents its being readily detected, which presumably accounts for this moth not having been previously observed. The larval stage averages 19·6 days and the pupal 8·3. The irregularity of wintering of individual rubber trees permits of a succession of generations of this insect. A small Hymenopteron and a Tachinid fly have been observed parasitising the caterpillars. At present this pest is of no serious importance, but if seeds are required commercially for the extraction of oil, observations as to its habits and remedial measures will be necessary.

SOUTH (F. W.). **Work of the Inspection Staff, January-March 1922.**—*Malayan Agric. Jl.*, x, no. 4, pp. 106-111. Kuala Lumpur, April 1922.

Crickets have again caused some damage to the bark of rubber trees in Malacca, but after a shower of rain they disappeared. *Oryctes rhinoceros* is doing much damage to coconut palms in Penang, where suitable breeding grounds abound. The main inspection work is concentrated on destroying these places and the larvae. The results of local campaigns against this beetle are described.

Pests of rice included the stem borer [*Schoenobius bipunctifer*], *Nephotettix* sp., *Podops coarctata*, and grasshoppers.

HUTSON (J. C.). **Report of the Entomologist.**—*Ceylon Dept. Agric., Rept. 1921*, pp. C. 23-26. Peradeniya, 1922.

In addition to the pests previously noticed [*R.A.E.*, A, x, 489], the following were recorded on tea in Ceylon in 1921: *Stauropus alternus* (lobster caterpillar), *Chalia doubledayi* (small faggot-worm), *Gracilaria theivora*, *Attacus atlas* (atlas moth), *Oscinis theae*, *Zeuzera coffeae* (red borer), *Saissetia hemisphaerica* (brown bug), *Coccus viridis* (green bug), (the last three having also been recorded as coffee pests), *Tetranychus bioculatus* (red spider), *Tarsonemus translucens* (yellow mite), *Eriophyes* (*Phytoptus*) *carinatus* (purple mite), *Calotermes militaris*, *Notolophus* (*Orgyia*) *posticus*, *Chionaspis theae*, *Toxoptera coffeae* (*Ceylonia theaecola*) (tea aphis), *Astycus immunis*, and the Passalids, *Chilomazus comptoni* and *Tiberius* sp.

Batocera rubus has been recorded on rubber. Pests of cacao are *Arbela quadrinotata*, *Tachardia albizziae* (which is usually controlled by larvae of *Eublemma* sp.), *Adoxophyes privatana*, and *Aularches miliaris*.

Investigations on *Leptocorisa acuta* (paddy bug) have been continued, and experiments with hand nets and paddy winnows smeared with a sticky material gave good results. Decaying meat and light traps were not successful. Natural enemies include a Pentatomid, *Asopus malabaricus*, two Reduviids, *Harpactor fuscipes*, and probably *Irantha* sp., and a Hymenopterous egg-parasite. Other rice pests were *Spodoptera mauritia*, *Schoenobius incertellus*, *Melanitis ismene*, *Dasychira securis*, *Leucania venalba*, *Lenodora vittata* and *Menida histrio*. At present only *Sylepta derogata* and *Atactogaster* sp. have been observed on cotton.

Pests of leguminous pests include *Terastia meticulosalis*, *Natada nararia*, *Astycus immunis*, *Aularches miliaris*, *Eupterote geminata* and

Taragama dorsalis, on *Erythrina* spp.; and *Ceroplastodes cajan*, and *Araecerus fasciculatus* on *Tephrosia candida*. The weevils *Odoiporus longicollis* and *Cosmopolites sordidus* were prevalent in some areas on bananas. *Citrus* spp. were attacked by *Papilio demoleus*, *Aleurocanthus woglumi* and *Suana concolor*. Tobacco pests include *Phthorimaea (Gnorimoschema) heliopa* and *Prodenia litura*. Aphids also occurred on this crop and were attacked by *Chilomenes sexmaculata*, *Coccinella transversalis* and Syrphid larvae. The Capsid, *Gallobelicus crassicornis*, was also present in large numbers on the same area as that infested by Aphids.

Miscellaneous pests include *Prodenia litura* and *Syntomoides imaon* on leaves of castor, *Dichocrocis punctiferalis* boring in cardamoms and turmeric, *Achaea janata* on pomegranate leaves, *Fascellina chromataria* on camphor leaves, *Sthenias grisator* girdling the stems of cassava, and *Hypsipyla robusta* and *Tachardia albizziae* on *Nephelium litchi*.

The following Tachinid parasites have been identified by Mr. J. D. Tothill: *Exorista guava*, Meig., from pupae of *Caprinia conchylalis* and larvae of *Stauropus alternus*; *Exorista* sp. from cocoons of *Heterusia cingala*; *Tricholyga sorbillans*, W., from larvae of *Notolophus posticus*; probably *Cuphocera pyrogaster*, Rond., from larvae of *Spodoptera mauritia*; a new species of *Frontina* from larvae of *Nacoleia annubilata*; and *Masicera* sp. from *Icerya aegyptiaca*.

JEPSON (F. J.). **Report of the Assistant Entomologist, 1921.**—*Ceylon Dept. Agric., Rept. 1921*, pp. C. 26–27. Peradeniya, 1922.

In experiments with castor plants as trap-trees for *Xyleborus fornicatus* (shot-hole borer of tea), some of these plants, at an elevation of 4,000 ft., were heavily infested during the year. Experiments were made to ascertain the effect of certain manures and insecticides on the inmates of galleries when buried with prunings, and the only substances that showed any benefit were kerisol, agrisol, apterite and phenol. In buried prunings development is able to proceed beneath the soil for a considerable period, all stages having been found up to nine weeks after burying. The percentage of galleries occupied by all stages of the borer beneath the soil falls from 91·7 per cent. to 18·5 per cent. in a period of 64 days, and in the same period the total inmates in an average of 100 galleries from 488 to 103·5. Burying alone is no safeguard against the later emergence of the beetle. Observations on manurial experiments in connection with this pest have already been noticed [*R.A.E.*, A, x, 435, 547].

SWEZEY (O. H.). **Insects attacking Ferns in the Hawaiian Islands.**—*Proc. Hawaiian Ent. Soc., 1921*, v, no. 1, pp. 57–65. Honolulu, October 1922.

A list is given of about 44 insects that attack ferns in Hawaii. None of the native species is particularly injurious to ferns, chiefly owing to parasitism, but if introduced into other countries they might prove serious pests. Besides the endemic insects, a few others are sometimes found on ferns, such as *Ceroplastes rubens*, Mask. (wax scale) on *Elaphoglossum reticulatum* and other ferns. The occurrence of *Syagrius fulvitarsis*, Pasc. (Australian fern weevil) and the establishment of its parasite, *Ischiogonus syagrii*, Full., have already been noticed [*R.A.E.*, A, ix, 469; x, 632, etc.].

GIFFARD (W. M.). **The Distribution and Island Endemism of Hawaiian Delphacidae (Homoptera) and other additional Lists of their Food Plants.**—*Proc. Hawaiian Ent. Soc., 1921,* v, no. 1, pp. 103–118, 5 tables. Honolulu, October 1922.

The distribution of the endemic DELPHACIDAE in Hawaii and further additions to the list of their food-plants are summarised in tables. Though these leafhoppers are of no economic importance, they are of interest because there are several injurious species in countries near Hawaii that have not yet been introduced, and because economic entomology in Hawaii owes its inception to the arrival in the Islands of *Perkinsiella saccharicida* (sugar-cane leafhopper).

TIMBERLAKE (P. H.). **Descriptions of New Genera and Species of Hawaiian Encyrtidae (Hymenoptera). III.**—*Proc. Hawaiian Ent. Soc., 1921,* v, no. 1, pp. 135–167, 17 figs. Honolulu, October 1922.

Coelopencyrtus mauiensis, sp. n., was reared from a larva of *Odynerus nigripennis.* A single female reared from *O. oahuensis* seems to represent a new species. A new genus, *Hypergonatopus,* is erected and includes two previously described species, *Echthrogonatopus hawaiiensis,* Perk. (the genotype) and *E.* (*Microterys*) *molokaiensis,* Ashm. The former was reared from Dryinid cocoons on sugar-cane. The host is presumably *Echthrodelphax fairchildi,* Perk., though possibly it may also infest *Haplogonatopus vitiensis,* Perk. *Hypergonatopus vulcanus,* sp. n., was reared from Dryinid cocoons, some of which were reared from parasitised nymphs of *Ilburnia coprosmicola,* Muir; *H. brunneipes,* sp. n., was bred from Dryinid cocoons from *I. koae,* Kirkaldy; and *H. flavipes,* sp. n., was also reared from Dryinid cocoons. The Dryinids in question were probably *Pseudogonatopus perkinsi,* Ashm. Keys to the species of *Coelopencyrtus* and *Hypergonatopus* are given for both sexes.

FISHER (R. C.). **Notes on the Poplar Saw-fly** (*Trichiocampus viminalis,* **Fall.**).—Reprint from *Scottish Naturalist,* pp. 151–154, 3 figs. [Edinburgh], September–October 1922.

Young poplars at Kew in 1921 were found infested with *Trichiocampus viminalis,* Fall., and *Croesus septentrionalis,* Leach, the latter in small numbers. The observations were made early in August, too late to obtain unhatched eggs. The egg-slits were found just below the leaf base, varying from 14 to 22, 7–11 on each side of the petiole. Larvae of *C. septentrionalis* died in captivity, but those of *T. viminalis* fed on the lower surface of the leaves, the veins only being left intact. They became more active on reaching the fourth instar, feeding singly or in twos or threes. It is hoped to obtain adult saw-flies from these in the spring. The larvae were found to be parasitised by the Tachinid, *Ptychomyia selecta,* Meig.

There is little risk of this pest appearing in large numbers and damaging young poplars, as parasitism effectively prevents this.

ANDERSON (T. J.). **Annual Report of the Division of Entomology, Kabete, for the Year ending 31st March 1921.**—*Kenya Colony Dept. Agric. Ann. Rept., 1920–21,* pp. 75–79. Nairobi, 1922.

The best dusting results against *Phytometra orichalcea,* F. (flax caterpillar) were obtained with 1 part Paris green to 3 parts extremely finely powdered lime. About 25 lb. is probably sufficient for an acre.

On a small scale this mixture gave a mortality of 95 per cent. The series of traps on the coast for coconut beetle [*Oryctes rhinoceros*] are to be discontinued as they have served their purpose. The life-cycle of this beetle is :—egg-stage 15 days, larval 80 or more days, pupal 21 days and adult often more than 2 months. As regards insects affecting coffee the work on thrips has advanced, but it has not been possible to rear the insects from egg to adult. Dusting has been tried for *Antestia* [*lineaticollis*], but with little success. The life-histories of *Plutella maculipennis* (diamond back moth), *Bagrada picta*, *Athalia sjöstedti* (turnip saw-fly) and a species of *Euxoa* have been worked out and will be published later.

PALMER (R.) & WESTELL (W. P.). **Pests of the Garden and Orchard, Farm and Forest.**—Med. 8vo, 413 pp., 47 plates. London, Henry J. Drane, 1922. Price 25*s*. net.

The word " pest " is used in this book in its most comprehensive sense and includes insects, mites, molluscs, worms, birds and other vertebrates, fungi and weeds, while the beneficial species also receive attention. The work is designed to be useful to the farmer, forester, fruit-grower and gardener in Britain, and to enable them to identify the pests that trouble them and to know the best way of exterminating or controlling them. The arrangement of species or subjects is alphabetical in each section, the work throughout consisting necessarily largely of compilation ; but well-constructed tables are a very useful feature—by their aid most insects or fungi infesting plants may be readily identified from the symptoms of infestation, and the correct treatment ascertained, without reading through lengthy descriptions.

Sections of the book are devoted to insecticides and fungicides, including the composition of the chemicals used, with formulae and methods of preparation. Fumigation, soil sterilisation and spraying are described ; while the antidotes for the various poisons are detailed.

There is a useful section on general information, dealing with such subjects as thermometer comparisons, the estimation of the cubical contents of greenhouses and the capacity of tanks in gallons. A monthly calendar of work against pests and a glossary of scientific terms are also included ; and there is an index to the scientific names of the invertebrates and fungi, and also a general index.

The illustrations, of which almost all are original, are exceptionally good.

Basket Worm.—*Planters' Chronicle*, xvii, no. 41, p. 581. Coimbatore, 14th October 1922.

An account is taken from the Rubber Growers' Association Bulletin for August, of damage done to rubber trees by the caterpillars of the small Psychid moth, *Acanthopsyche snelleni*. The caterpillars were very numerous and were attacking recently tapped surfaces, making small wounds from which latex flowed freely. They are frequently present in small numbers but generally confine themselves to the lichens, etc., on the outer bark. The females live and oviposit under conical silken cases, and these should be destroyed whenever possible. It is suggested that the tapped surface should be protected by a 2 per cent. mixture of kerosene applied once a week. Where numbers are present between the cut and the ground level, they should be hand-collected, or the tree painted as suggested above. A ring might also be painted round the tree above the tapping surface, to prevent the insects above it from descending.

FORBES (S. A.) & GROSS (A. O.). **The Orchard Birds of an Illinois Summer.**—*Bull. Illinois Nat. Hist. Survey*, xiv, art. 1, pp. 1–8, 6 plates. Urbana, Ill., June 1921. [Received 8th November 1922.]

An extensive and thorough survey has been made of the birds occurring in Illinois in the summer, both in orchards and in other situations, and lists are given showing the relative numbers of each.

GLENN (P. A.). **Codling-moth Investigations of the State Entomologist's Office, 1915, 1916, 1917.**—*Bull. Illinois Nat. Hist. Survey*, xiv, art. 7, pp. 219–289, 8 figs. Urbana, Ill., August 1922.

This paper gives in a more detailed form, with many graphs and tables, information that has previously been noticed [*R.A.E.*, A, x, 479].

TREHERNE (R. C.). **Bio-chemical Aspects of Insect Control.**—*Scientif. Agric.*, iii, no. 3, pp. 109–113. Ottawa, November 1922.

The only pests of really serious economic importance are those with especially selective habits which, by reason of their type of injury, or by their ability to reach optimum conditions of development, affect extensively the commercial cultivation or use of a crop. Evolution, which has been a factor in the development of structure, has doubtless been of some importance also in the development of habit, and the possibility is suggested that in the future it may be possible, by cataloguing the various external and internal parasites and bacterial diseases, to develop a line of ancestry which will support or contest evolutionary theories based on structures.

Knowledge regarding the fundamental reasons why insects attack or do not attack certain plants and animals is at present very incomplete, but it is possible that, as a result of the separation of the essential oils or extracts of plants, liquid sprays or medicated powders may be prepared that would have a negative chemotropic effect on insect pests. This is already being done with tobacco, pyrethrum, hellebore, derris and other substances, and there is no reason why methods should not be developed for combating insects along physiological lines.

GIRAULT (A. A.). **New Chalcid-flies from Eastern Australia. iii. Hymenoptera.**—*Insecutor Inscitiae Menstruus*, x, nos. 7–9, pp. 148–154. Washington, D.C., July–September 1922.

The species dealt with include *Stomatoceras colliscutellum*, sp. n., reared from Coccinellids; *Tumidicoxella plutellophaga*, sp. n., reared from *Plutella maculipennis* (*maculata*); and *Meselatus ficus*, gen. et sp. n., found in fruit of *Ficus*.

DEGRULLY (L.). **Précautions à prendre pour l'emploi des arsenicaux.**—*Progrès agric. & vitic.*, lxxviii, no. 46, pp. 464–465. Montpellier, 12th November 1922.

In view of the authorisation of the use of soluble arsenicals [*R.A.E.*, A, x, 536], the precautions to be taken in using them, drawn up by the French Ministry of Agriculture, are quoted.

CIFERRI (R.). **La filossera della vite.** [The Vine *Phylloxera*.]—*Riv. Agric.*, xxvii, nos. 44–45, pp. 658–660, 674–676. Parma, 3rd & 10th November 1922.

This article on *Phylloxera vastatrix* in Italy gives a short account of its morphology and biology and method of spread, of the resistance of American stocks, recognition of infestation, preventive and remedial measures, and the economic losses caused by it.

LEEFMANS (S.). **„Valsche Munters."** [*Haplosonyx* spp.]—*Tropische Natuur*, x, no. 3, pp. 38–44, 12 figs. Weltevreden, 1921. [Received 6th November 1922.]

Circular perforations in the leaves of *Alocasia macrorrhiza*, *A. metallica* and *Colocasia gigantea* in Java are due to a Galerucid beetle, the male of which has been described as *Haplosonyx parvulus*, Jac., and the female as *H. apicicornis*, Jac. It appears to be known also as *H. sumatrae*, F., which is probably the correct name for it. Feeding occurs at night, the beetle remaining hidden by day. Eggs were found in batches of 37–87 at the base of the leaf-stem or even on the ground. The gregarious larvae feed on the stem or blade of the leaf and develop in 31–32 days, while the pupal stage underground takes 9–12 days. The total life-cycle occupies about 2½ months. Another species with the same habits, feeding on *Alocasia gigantea*, has been identified as *H. semiflava*, Wied.

LEEFMANS (S.). **Een vischdief; *Belostoma indicum*, L. & S., de groote indische bootsman.** [The large Indian Boatman, *B. indicum*, predacious on Fish.]—*Tropische Natuur*, x, no. 6, pp. 91–94, 5 figs. Weltevreden, 1921. [Received 6th November 1922.]

Belostoma indicum, L. & S., not only feeds on dead fish, but attacks living ones, which it grasps with its legs and bores with its proboscis, apparently injecting a poison that kills its prey before the latter can struggle. It lays its eggs in batches on plant stems just above water-level. Fish breeding is carried out in the Dutch East Indies, so that this bug is of some economic importance.

LEEFMANS (S.). **De kedondong-springkever (*Podontia affinis*, Grond.).** [*P. affinis*.]—*Tropische Natuur*, xi, no. 1, pp. 11–13, 5 figs. Weltevreden, January 1922.

A flea-beetle, *Podontia affinis*, Grond., is recorded as defoliating *Spondias dulcis* at Buitenzorg, and must therefore be included among fruit-tree pests in Java. One female laid no fewer than 525 eggs in three months, from November to February. Batches of 7–27 were found on the lower surfaces of the leaves. Many eggs are destroyed by a parasite, *Schedius* sp. Incubation takes 7 days, and the larval and underground pupal stages occupy 18–19 and 13–16 days respectively.

KUWANA (I.). ***Bemisia shinanoensis*, sp. n., a new Whitefly from Japan.**—Reprint from *Byochu Gai Zasshi* [*Jl. Plant Prot.*], ix, no. 9, 5 pp., 4 figs. [Yokohama], 1922. [Received 7th November 1922.]

Bemisia shinanoensis, sp. n., is described from leaves of cultivated mulberry in Shinano (Japan). This species is allied to *B. berbericola*, Ckll., but is much larger.

Resumo do relatorio apresentado em 10 de Julho de 1920 ao sr. dr. Director da Agricultura, pela Commissão julgadora do concurso de apparelhos e ingredientes para a extincção da formiga saúva (*Atta sexdens*) (**L.**) **Fabr.** [Summary of the Report of 10th July 1920 made to the Director of Agriculture by the Committee of Judges of Apparatuses and Chemicals for destroying *Atta sexdens*.] —*Bol. Agric.*, xxii, no. 11–12, pp. 319–329, 4 figs. S. Paulo, November–December 1921. [Received 11th November 1922.]

In Brazil *Atta sexdens*, L., is a serious agricultural pest. The detailed results of a number of fumigation trials conducted in S. Paulo in 1919 are given.

Moreira (C.). **O cafeeiro no Estado da Parahyba do Norte e o coccideo parasita** (*Cerococcus parahybensis*, **Hempel**), **vulgarmente conhecido por "vermelho."** [Coffee in the State of Parahyba and the Coccid Pest, *C. parahybensis*, known as "vermelho."]—*Bol. Agric.*, xxii, no. 11–12, pp. 339–344. S. Paulo, November–December 1921. [Received 11th November 1922.]

Coffee in Parahyba is attacked by *Cerococcus parahybensis*, Hemp., and the bushes may wither away if the infestation is severe. As treatment with insecticides is impracticable, the scales must be brushed or scraped off. Bushes that are very severely injured should be cut down and burned. The transport of parts of coffee plants within the State or their export should be prohibited, but this does not apply to coffee beans. Besides this scale, which may be peculiar to Parahyba, other species observed were *Pseudococcus citri*, Risso, on the shoots and roots, and *Pseudaonidia trilobitiformis*, Hemp., and *Ischnaspis longirostris*, Sign., on the leaves.

Townsend (C. H. T.). **Relatorio dos serviços entomologicos do anno de 1921.** [Report of the S. Paulo Entomological Service for 1921.]—*Bol. Agric.*, xxiii, no. 1–2, pp. 7–23. S. Paulo, January–February 1922. [Received 11th November 1922.]

A method of fumigating the nests of [*Atta sexdens*] with hydrocyanic acid gas has been perfected. It was found that satisfactory results are obtained if the pot containing the sulphuric acid and water is placed close to the hole and covered with an empty kerosene tin immediately the cyanide is added. The edges of the tin must cut into the ground or be banked up. Fumigation requires 8–10 days. In the case of large nests the various main holes must be dealt with at the same time (holes that are not being treated being blocked up), and the tins must be covered with earth, their positions being marked with stakes. It is essential that cyanide of 96–98 per cent. purity be used. A nest with 20 holes scattered over an area of about 6 yards diameter has a gallery space of about 90 cu. ft. If one hole of such a nest is treated, the quantities needed are about $\frac{4}{5}$ oz. cyanide, $1\frac{1}{4}$ fluid oz. sulphuric acid, and $1\frac{3}{4}$ oz. water. Instead of this mixture, 16 cc. of liquid hydrocyanic acid can be used with advantage, especially as the fumes cause a greater mortality in the lower portion of the nest, whereas the contrary occurs with gas generated in the ordinary way. The author considers the question of infestation by this ant to be definitely solved by hydrocyanic acid gas fumigation, owing to its immense superiority over all other methods.

If the view is correct that *Platyedra* (*Pectinophora*) *gossypiella*, Saund., can breed in *Hibiscus esculentus* and *H. cannabinus* (though

in Texas it has been found on cotton only), there is no doubt that it can maintain itself on various wild cotton plants in Brazil, thus rendering its eradication impossible by existing methods. The use of parasitic enemies will be the best means of checking it. A list is given of the flies that parasitise this moth or that might prove useful in this connection, with their countries of origin and hosts.

Schistocerca paranensis is a locust of considerable importance in S. Paulo. A list of 22 flies that are important parasites of locusts in various parts of the world is given.

Lamellicorn larvae, some of which belong to the genera *Podalgus*, *Dyscinetus*, *Megaceras* and *Lachnosterna* (*Phyllophaga*), cause much injury to the roots of rice, sugar-cane and grasses in pastures. A list of the known flies attacking these larvae or the adult beetles is given.

The sugar-cane borer, *Diatraea*, which is very harmful in S. Paulo, is being combated in Louisiana by a Tachinid fly, *Euzenilliopsis diatraeae*, imported from Cuba. The sugar-cane root borer, *Diaprepes*, occurs in Brazil, but *Ceromasia* (*Microceromasia*) *sphenophori* should prove capable of keeping it in check.

A Longicorn beetle, apparently *Hypselomus cristatus*, Perty, is a dangerous borer infesting the sweet-potato. Infested tubers should be given to pigs or otherwise destroyed. The tubers should be planted at some depth and the shoots banked up with earth. Crop rotation must be practised, and slips for planting must be cut off at some distance from the ground.

As pragas da lavoura. [Agricultural Pests.]—*Bol. Agric.*, xxiii, no. 1–2, pp. 23–26. S. Paulo, January–February 1922. [Received 11th November 1922.]

A 10 per cent. kerosene emulsion is recommended against *Lepidosaphes beckii*, Newm., *Hemichionaspis aspidistrae*, Sign., and *Pseudococcus* sp., all of which scales infest oranges. Coffee was attacked by *Coccus viridis*, Green, and *Saissetia hemisphaerica*, Targ., which are preyed upon by a Coccinellid; a suitable spray consists of an 8 per cent. kerosene emulsion.

DE CAMPOS NOVAES (J.). **Um broqueador do cafeeiro,** *Xyleborus cofeicola*, **n. sp., Fam. Ipidae.** [A Coffee Borer, *X. cofeicola*, sp. n.]—*Bol. Agric.*, xxiii, no. 3–4, pp. 67–70, 1 fig. S. Paulo, March–April 1922. [Received 11th November 1922.]

Coffee branches are mined by a Scolytid beetle described and figured here as *Xyleborus cofeicola*, sp. n. The injury permits the entrance of saprophytic fungi, and the infestation results in the death of the coffee bush in about three years.

As pragas da lavoura. [Pests of Agriculture.]—*Bol. Agric.*, xxiii, no. 5–6, pp. 133–144. S. Paulo, May–June 1922. [Received 11th November 1922.]

Some of the pests concerning which complaints were received were *Icerya purchasi* on roses, *Pseudococcus grandis*, Hemp., on jaboticabeira [*Myricaria jaboticaba*], and *Aleurothrixus horridus*, Hemp., on lemon. Against woolly aphis, *Eriosoma* (*Schizoneura*) *lanigerum*, Hausm., on apple, spraying with a 10 per cent. kerosene emulsion is recommended, which also serves against *Hemichionaspis aspidistrae*, *Chrysomphalus aonidum*, *Coccus hesperidum* and *Lepidosaphes beckii* on orange.

BONDAR (G.). **Os insectos damninhos. XXIV. A vaquinha da batata, *Epicauta atomaria*, Klug. XXV. O *Aleyrodes brassicae*, Walker, praga das hortas na Bahia.** [Injurious Insects. XXIV. The Potato Beetle, *E. atomaria*. XXV. *Aleurodes brassicae*, a Pest of Market-gardens in Bahia.]—*Chacaras e Quintaes*, xxvi, no. 4, pp. 292–294, 5 figs. S. Paulo, 15th October 1922.

The adults of *Epicauta atomaria*, Kl., and other beetles of this genus are most injurious pests of potato foliage. In Brazil they appear in late spring and early summer and may destroy a field in a few days. The first-stage larvae are important enemies of grasshoppers. The adults may be shaken into pans containing water covered with kerosene, or in general infestations the plants should be sprayed with Paris green.

A whitefly, almost certainly *Aleurodes brassicae*, Wlk., which injures the leaves of cabbages in Bahia, is not yet known in the other States of Brazil, and measures must be taken to limit its spread. A study of its natural enemies in Europe and the possible introduction of suitable species is suggested. Growers are not likely to agree to give up the cultivation of cruciferous crops for a year or two and thus eradicate the pest.

PECKHOLT (W.). **A "saúva," seus costumes, maleficios e meios de exterminio.** [*Atta sexdens*, its Habits and Injuriousness and the Methods for destroying it.]—*Chacaras e Quintaes*, xxvi, no. 4, pp. 297–299, 1 fig. S. Paulo, 15th October 1922.

The title of this article on the leaf-cutting ant, *Atta sexdens*, L., indicates its contents.

PAOLI (G.). **Una missione nell'isola di Madera per raccogliere il parassita del *Chrysomphalus dictyospermi*, Morgan.**—*Nuovi Ann. Minist. Agric.*, ii, no. 3, pp. 407–416, 2 figs. Rome, 30th September 1922.

An account is given of the author's visit to Madeira for the purpose of collecting, for shipment to Italy, *Aspidiotiphagus lounsburyi*, Berl. & Paoli, which is an effective parasite of the citrus scale, *Chrysomphalus dictyospermi*, Morg., infesting oranges there [*R.A.E.*, A., x., 412]. The parasite has been distributed in the eastern portion of the Italian Riviera and in Sicily.

EGGERS (H.). **Seltene und neue paläarktische Borkenkäfer. IV.** [Rare and new palaearctic Bark-beetles. IV.]—*Ent. Blätter*, xviii, no. 3, pp. 116–121. Berlin, 30th September 1922.

Scolytus (Eccoptogaster) transcaspicus, sp. n., from Transcaucasia, is described. *S.* (*E.*) *siculus*, Eggers, is a synonym of *S.* (*E.*) *königi*, Schev.; *Crypturgus gaunersdorfferi*, Reitt., of *C. parallelocollis*, Eichh.; and *Pityogenes lipperti*, Henschl, of *P. calcaratus*, Eichh. *P. pilidens*, Reitt., a name used for the species occurring in the Mediterranean and Black Sea regions, southern Alps and southern Hungary is a synonym of *P. bistridentatus*, Eichh., but an Alpine species, confused and included with *P. bistridentatus*, is here described as *P. alpinus*, sp. n.; it occurs in the Alps, Black Forest, Riesengebirge and Tatra, the chief food-plants being *Pinus montana* (*pumilio*) and *Pinus cembra*. *Phloeosinus hercegovinensis*, sp. n., is described from Herzegovina, and *Scolytus* (*E.*) *mediterraneus*, sp n., from the Crimea, Asia Minor, Tunis, Algiers and Sicily.

REVECHE (F. R.). **Life History and Habits of some common Philippine Flea Beetles.**—*Philippine Agriculturist,* xi, no. 2, pp. 29–48, 4 plates. Los Baños, September 1922.

Thirteen species of flea-beetles have been observed in the course of this study, all of which are more or less numerous in the Philippines. *Psylliodes balyi,* Jac., *P. splendida,* Har., and *Nisotra gemella,* Er., are dealt with in detail. The larvae of the first two belong to the class that bore into the stem, while the other class, to which *N. gemella* belongs, feeds on the tissues of the roots. As a rule, the incubation period of any species lasts about 5–10 days, the larval 16–27 days, and the pupal 4–8 days, the total life-cycle requiring 26–45 days. Damage is done by both larvae and adults. The latter are generally most numerous in December and January. *P. balyi* continues abundantly until July, the adults eating small, irregular holes in the epidermis, the leaves becoming perforated and gradually dropping. The chief cultivated food-plant of this species is *Solanum melongena* (egg-plant). *N. gemella* appears more or less abundantly throughout the year, the chief food-plants being Malvaceae, and, in particular *Hibiscus sabdariffa* (roselle) and *H. rosa-sinensis,* okra [*H. esculentus*] being only slightly attacked. The adults feed on the lower surface of the leaves, which they skeletonise, causing many to fall. They then leave the foliage and feed on the epidermis of the stem.

Other species dealt with are *Luperomorpha prolixa,* Er., *Longitarsus manilensis,* Weise, *Nisotra* sp., *Pagria graphica,* Weise, and unnamed species of *Longitarsus, Psylliodes, Hespera, Phyllotreta,* and *Chaetocnema.* A list is given of the food-plants of each species.

Experiments with spraying mixtures showed that the best results are obtained by the use of $1\frac{3}{8}$ lb. Paris green in 100 gals. Bordeaux mixture. This entirely cleared egg-plants and roselle of infestation. Rotation of crops is also recommended. Weeds and wild plants serving as food should be destroyed. Any soil clinging to transported plants should be examined for the presence of the larvae.

WOODWORTH (H. E.). **A Host Index of Insects injurious to Philippine Crops. iii.**—*Philippine Agriculturist,* xi, no. 2, pp. 49–55. Los Baños, September 1922.

This list is supplementary to others previously noticed [*R.A.E.,* A, ix, 584; x, 378]. Additional notes are included regarding the Noctuid, *Earias fabia,* Stoll, which enters okra pods at the tip or side and feeds on the seeds, but has not yet been recorded on cotton; a Pyralid, apparently an undescribed species of *Alophia,* which infests the fruit of *Achras sapota*; the Psychid, *Clania fuscescens,* Snell., one of the largest bagworms of the region, sometimes infesting *Citrus*; the Arctiid, *Maenas maculifera,* Wlk., defoliating mango (*Mangifera indica*) and *Canangium odoratum,* for which the remedy is to burn the larval webs and spray the foliage with lead arsenate; *Notolophus* (*Orgyia*) *posticus,* Wlk., on *Citrus* and mango, as well as other food-plants previously recorded; *Sylepta derogata,* F., found in large numbers rolling the leaves of cotton plants at the College of Agriculture, from the larvae of which have been bred the parasites, *Chalcis obscurata,* Wlk., *Elasmus philippinensis,* Ashm., and *Pleurotropis* sp.; *Homona menciana,* Wlk., a minor pest of cotton; and the sugar-cane borer, *Sesamia uniformis,* Dudgeon, which burrows into the canes at the points or buds.

Allen (H. W.). **Ovipositional Habit of** *Pyraustomyia penitalis*, **Coq. (Dip., Tachinidae).**—*Ent. News*, xxxiii, no. 9, pp. 263–264. Philadelphia, Pa., November 1922.

Pyrausta ainsliei, Heinr. (smartweed borer) infests *Polygonum pennsylvanicum* by entering the cane by a small hole at the node, and develops within short tunnels between the nodes, working first in small colonies near the tip and later singly, in the older succulent joints. The Tachinid parasite of the borer, *Pyraustomyia penitalis*, Coq., approaches an infested node and quickly fastens a minute maggot, enclosed in a very thin sheath of chorion, upon the cane, near the entrance hole of the borer. The maggot immediately emerges and finds and enters the tunnel of the borer. Its subsequent action has not been observed, but young maggots have been recovered from the body fluid of borers within a few hours of their emergence.

Fernald (H. T.). **Insect Conditions of the Year 1921 in Massachusetts.**—*34th Ann. Rept. Mass. Agric. Expt. Sta., 1921*, pp. 50A–62A. Amherst, Mass., 1922.

Hylemyia cilicrura, Rond. (seed-corn maggot) appeared locally in serious numbers in onion fields. Those manured with cotton-seed meal were most severely infested, while those not so treated were free, even when adjacent to infested ones. No trace of the fly was, however, observable in the meal before use. The fields were replanted, and no injury was noticed afterwards.

Heliothis (*Chloridea*) *obsoleta*, F., was unusually abundant almost throughout the State, sweet maize being chiefly attacked, and 95 to 100 per cent. of the crop being lost in some localities. A period of cold weather with light snowstorms killed a great many of the larvae.

The striped cucumber beetle [*Diabrotica vittata*] was also present in unusual numbers, and the birch leaf skeletoniser [*Bucculatrix canadensisella*] after having been practically absent for about ten years, reappeared in numbers in the eastern part of the State.

A table records all the insects about which enquiries were made during the year, with the localities from which the infestations were reported.

Franklin (H. J.). **Report of the Cranberry Station for 1919 and 1920.**—*Mass. Agric. Expt. Sta.*, Bull. 206, pp. 149–168. Amherst, Mass., 1921. [Received 14th November 1922.]

This report amplifies information concerning cranberry pests in Massachusetts in 1919 and 1920 that have already been noticed [*R.A.E.*, A, ix, 49; x, 55]. The parasites of *Crambus hortuellus*, Hb. (cranberry girdler), have now been identified as *Cremastus facilis*, Cress., *Macrocentrus* sp., and *Phygadeuon* sp.

Experience has led to the conclusion that winter-flooded bogs should be sprayed once, a few days before the blossoms are out, with 1 U.S. gal. Black-leaf 40, with 16 lb. fish-oil soap in 400 U.S. gals. water. This treatment largely takes the place of June reflooding in reducing the numbers of *Rhopobota naevana*, Hb. (*vacciniana*, Pack.) (blackhead fireworm); *Clastoptera vittata*, Ball (spittle insect); *Crambus hortuellus*; leafhoppers (*Euscelis*) and springtails (Collembola).

DUTT (A.). **Report of the Assistant Entomologist for the Year 1921.**—[*Iraq*] *Admin. Rept. Dept. Agric., 1921*, pp. 61–63. Baghdad, 1922.

Pests of economic importance recorded during the year included larvae of *Sesamia cretica*, boring in maize stems; *Gryllotalpa* sp. in young tomato seedlings (these mole-crickets can be killed by flooding the irrigation channels so as to fill the burrows); *Nezara viridula*, infesting tomatos, against which a 10 per cent. kerosene emulsion was successful; peach stem Aphids, which are being treated by many growers with soap and tobacco decoction and kerosene emulsion; *Cydia pomonella* (codling moth) on apples and peaches; *Aspidiotus perniciosus* (San José scale); the mite *Oligonychus* and the caterpillars of *Batrachedra amydraula* on dates [*R.A.E.*, A, x, 401, 402]; Tortricid larvae, on freshly opened buds of apples, apricots, plums, etc.; *Stephanitis pyri* (lace bug), which probably hibernates as an adult, reappearing in the spring, when the leaves should be sprayed with kerosene; *Earias insulana* (spotted cotton bollworm), infesting from 30 to 70 per cent. of bolls, and parasitised up to 30 per cent. of its numbers by the Braconid, *Rhogas kitcheneri*; *Nezara graminea*, which sucks the juice of cotton bolls, preventing their development, and for which hand-picking is suggested; the bug, *Eurygaster integriceps* on wheat; and the Coccids, *Parlatoria blanchardi* and *P. calianthina*, for which lime-sulphur wash in winter is recommended.

JACAZIO (A.). **La formica argentina.** [The Argentine Ant.]—*Il Picentino*, xi, no. 10, pp. 166–168. Salerno, September 1922.

Iridomyrmex humilis, Mayr, occurs in the north of the peninsula of Sorrento. Accounts of its habits and of the best means for combating it are given.

[**Reports on the State of Crops in each Province of Spain on the 20th October 1922.**]—*Bol. Agric. téc. & econ.*, xiv, no. 166, pp. 927–941. Madrid, 31st October 1922.

In Badajoz oranges have been found to be infested by *Icerya purchasi*, and *Tortrix viridana* is doing considerable harm in forests of evergreen oak.

KUWANA (I.). **Studies on Japanese Monophlebinae. Contribution I.: The Genus** *Warajicoccus*.—[*Japan*] *Dept. Agric. & Comm., Imp. Plant Quar. Sta.*, Bull. 1, 58 pp., 12 plates. Yokohama, August 1922.

This is a careful study of the biology of the Japanese species of this group of Coccids. The general characters of the subfamily are discussed, and a key is given to the Japanese genera. A new genus, *Warajicoccus*, is erected. *W. pinicola*, sp.n., occurs on *Pinus* spp., and *W. howardi*, sp.n., is found on a variety of plants, including *Acacia, Hibiscus, Prunus, Rosa indica, Viburnum*, etc., but not on conifers.

KUWANA (I.). **Studies on Japanese Monophlebinae. Contribution II.: The Genus** *Icerya*.—[*Japan*] *Dept. Agric. & Comm., Imp. Plant Quar. Sta.*, Bull. 2, 43 pp., 4 plates. Yokohama, March 1922.

This paper deals with the genus *Icerya* and includes a key to the Japanese species, *I. purchasi* and *I. seychellarum*, with extensive

life-history notes on them. The former is a serious pest of *Citrus*. The natural enemies of these Coccids, which are also fully dealt with, include the Coccinellid, *Novius cardinalis*, and the Agromyzid, *Cryptochaetum grandicorne*, which attacks *I. seychellarum* only.

Agulló (J.). *Lochmaea sanguinolenta*, **a Coleopteron injurious to the Melon in Catalonia, Spain.**—*Agricultura*, v, no. 15, pp. 354–355, 1 fig. Barcelona, 1921. (Abstract in *Internat. Rev. Sci. & Pract. Agric.*, xiii, no. 2, pp. 266–267. Rome, February 1922.) [Received 20th November 1922.]

In September 1920 a whole crop of melons in the province of Tarragona was destroyed by *Lochmaea sanguinolenta*, F., not previously known as a pest of *Cucumis melo*. The beetle devours the shoots and leaves of seedlings, which are killed in consequence. It frequently oviposits on the leaves, and as the larvae live entirely on the roots, the melon plants are soon killed. Success was attained with two sprayings, at an interval of five or six days, with 1 lb. sodium arsenate anhydride (embodying 60 per cent. arsenic acid) and 2½ lb. slaked lime in 25 gals. water.

Malenotti (E.). **La comune Panorpa** (*Panorpa comunis*) **dannosa al Pomario.** [*P. communis* injurious to the Apple Orchard.]—Reprint from *Agricoltura Vicentina*, liv, Ser. 4, no. 10, 7 pp., 3 figs. Vicenza, 15th October 1922.

A Neuropteron, *Panorpa comunis*, has been observed attacking apples in the district of Vicenza, the injury permitting the subsequent entry of the fungus *Sclerotinia fructigena*. The female scorpionfly deposits batches of eggs in damp ground at a depth of about 2 mm. The larvae hatch in about 8 days, and apparently feed on dead insects and soil detritus. After a month the larvae remain for 10–21 days in an earthern cell and there transform into nymphs. The nymphal stage lasts about a fortnight. There are two generations a year, in May and in August-September. It is the second that injures apples. Hibernation occurs in the larval or nymphal stage. As adults have been found in the traps baited for wasps, they might be tried in May.

Malenotti (E.). **Una grave infestione dell'** *Anuraphis persicae-niger*, **Smith, sulle radici del Pesco.** [A severe Infestation of Peach Roots by *A. persicae-niger*.]—Reprint from *Il Coltivatore*, 1922, no. 31, 7 pp., 1 fig. Casale Monferrato, 10th November 1922.

Anuraphis persicae-niger, Smith, has occurred in Italy during the past ten years, but has often been mistaken for *Anuraphis persicae*, Boy. The tip of the abdomen and the antenna of a root-infesting apterous female are figured to facilitate identification. Whereas *A. persicae* has no root form, *A. persicae-niger* has both a root form and an aerial one, the latter injuring the branches, buds and leaves like *A. persicae*. The grower whose peach nursery was attacked used a tobacco-soap-petroleum emulsion, but failed to achieve complete success because the application was made in May, when only a portion of the aerial forms had migrated to the roots; the insecticide in the soil had lost its effect by the time the remainder entered the ground. Treatment in the middle or at the end of June should prove effective. Del Guercio has suggested that the cracks found in the ground in June suffice to

allow the liquid to penetrate and that about 17 fluid oz. of solution (containing 2–3 per cent. of carbolic tobacco extract and 0·5 per cent. of soap) is a sufficient quantity for a nursery plant. Growers whose peach plants are as yet uninfested should examine the roots of newly purchased material. Legislation prohibiting the sale of plants infested by *A. persicae-niger* is required in Italy.

SMITS VAN BURGST (C. A. L.). **Chalcididae, nieuw voor de Nederlandsche fauna.** [Chalcids new to Holland.]—*Ent. Ber. Ned. Ent. Vereen.*, vi, no. 125, p. 71. The Hague, 1st May 1922. [Received 20th November 1922.]

Habrocytus tenuicornis, Först., was the chief parasite bred from apple buds injured by the weevil, *Anthonomus pomorum*, L., the others being *Pimpla pomorum*, Ratz., and *Bracon discoideus*, Wesm. It is not certain whether *H. tenuicornis* is a primary or a secondary parasite. *Alaptus pallidicornis*, Först., which is closely allied to *Litus nigriceps*, Burgst, was bred from Psocid eggs taken from peach. *Blastothrix schönherri*, Westw., was bred from a scale, *Phenacoccus aceris*, Sign., on peach.

OUDEMANS (J. T.). *Kermes roburis* **(Fourcr.) Fern., in Nederland (Coccina).** [*K. roburis* in Holland.]—*Ent. Ber. Ned. Ent. Vereen.*, vi, no. 125, pp. 73–74. The Hague, 1st May 1922. [Received 20th November 1922.]

Kermes roburis, Fourcr., which had not apparently been previously recorded from Holland, was taken from the bark of oak in 1921.

OUDEMANS (J. T.). *Megastigmus spermotrophus*, **Wachtl, de vernieler van het zaad van** *Pseudotsuga douglasi*, **Carr. (Chalcididae).** [*M. spermotrophus*, the Destroyer of the Seed of *P. taxifolia*.]—*Ent. Ber. Ned. Ent. Vereen.*, vi, no. 125, pp. 77–78. The Hague, 1st May, 1922. [Received 20th November 1922.]

The seed of Douglas fir, *Pseudotsuga taxifolia* (*douglasi*), infested with *Megastigmus spermotrophus*, Wachtl, cannot be distinguished from non-infested seed until the Chalcid has emerged in spring, when a circular hole is visible. This Chalcid appears to be a true seed pest and not a parasite, for no traces of a host-insect have been found within the seeds.

OUDEMANS (J. T.). **De Wespen-enquête 1921.** [The Wasp Enquiry of 1921.]—*Ent. Ber. Ned. Ent. Vereen.*, vi, no. 125, pp. 78–80. The Hague, 1st May 1922. [Received 20th November 1922.]

There was a plague of wasps in Holland in 1921, *Vespa germanica*, F., and *V. vulgaris*, L., being the predominant species. Many kinds of fruit were attacked and considerable losses resulted. Stored fruit and dried fruit were also injured. The author has found that in spring the queens readily visit the flowers of the snowberry, *Symphoricarpus racemosus*, and that they may be captured and killed in large numbers on this plant.

Havreaalens Levevis og Bekaempelse. [Life-history of the Oat Eelworm and Measures against it.]—*Statens Forsøgsvirksomhed i Plantekultur*, Medd. 93, 4 pp., 3 figs. Lyngby, June 1922.

The life-history of the oat eelworm (*Heterodera schachtii* var. *avenae*) is recorded. The main food-plant is oats, on which serious attacks have been recorded from many parts of Denmark. Heavy infestations are met with locally on wheat, and less common and less serious ones on maize, grasses and weeds; rye is seldom attacked. The Nematode gives the field an uneven and spotted appearance, which distinguishes it from that due to scarcity of nutriment, which affects all plants. Experimentally it has been shown that the larvae can wander 3 metres in two weeks, and in the open field they are still further spread by various means. The brown cysts may contain young for more than eight years. Rotation of crops has proved the best means of diminishing this pest. In infested fields oats or crops mixed with oats ought not to be cultivated more than once or twice in eight fields of rotation crops. The soil must be as compact as possible, and only a very light harrowing is permissible in spring, followed by heavy rolling. Early sowing is recommended, so that the plants are well grown before the Nematodes appear.

HARGREAVES (H.). **Annual Report of the Government Entomologist, 1921.**—*Uganda Dept. Agric. Ann. Rept., 1921*, pp. 57–64. Entebbe, 1922.

During the period under review no new insect pest of importance was observed, though several minor ones hitherto unrecorded as such in Uganda were noticed. Despite continuous collecting and breeding out of the egg-parasites, *Hadronotus antestiae*, Dodd, and *Telenomus truncativentris*, Dodd, the attacks of *Antestia lineaticollis*, Stål, on coffee extended over three or more months. It now appears necessary to determine the species of wild food-plants in forest and other areas near coffee estates. Studies on the life-history of *Stephanoderes hampei*, Ferr., show that the eggs are usually laid in numbers up to ten in berries, and hatch in 9 days. The pupal stage lasts 7–8 days. The adults rest without feeding for 5 or 6 days, and in captivity, 17 days. Females fed in captivity lived 9 weeks, but the males only 10–14 days. A parasite was discovered laying eggs on larvae and pupae. Its life-cycle occupies 25–28 days, and in captivity the adults live for 15 days without feeding. This knowledge concerning it will be made use of in outbreaks of the pest. Other coffee pests included *Pseudococcus citri*, Risso (coffee root mealy-bug), against which a spray of tobacco extract and soap proved fairly satisfactory, while applications of lime to the soil might be useful; *Dirphya princeps*, Jord. (yellow-headed stem-borer), which was parasitised on one estate by a Braconid; *Apate monacha*, F.; *A. indistincta*, Murr.; *Anthores leuconotus*, Pasc., which had not previously been recorded since 1918; *Bixadus sierricola*, White, which is new to Uganda, though a serious pest in West Africa; *Metadrepana glauca*, Hmp.; *Trirhrithrum nigerrimum*, Bezzi, var. *coffeae*, Bezzi; *Diarthrothrips coffeae*, Will., against which are recommended sprays of 2 gals. commercial lime-sulphur, 2 gals. 3 per cent. tobacco extract and 200 gals. water or of 7 per cent. kerosene emulsion, and the burning of all fallen leaves from infested trees; *Leucoptera coffeella*, Stn.; *Anoplocnemis curvipes*, F.; *Gryllotalpa africana*, P. de B.; *Toxoptera coffeae*, Nietn.; and *Coccus viridis*, Green.

Cotton pests included: *Aphis gossypii*, Glov., which was very injurious and on which *Chilomenes vicina*, Muls., and *C. lunata*, F., are predacious; *Earias insulana*, Boisd.; *Lobosia aelopa*, Meyr.; *Argyroploce leucotreta*, Meyr.; *Dysdercus nigrofasciatus*, Stål; *D. pretiosus*, Dist.; *Oxycarenus hyalinipennis*, Costa; *O. gossypinus*, Dist.; and *Termes* (?) *bellicosus*, L. *Platyedra gossypiella*, Saund., and *Eriophyes gossypii*, Banks, have not been found.

Minor pests on maize included: *Pseudococcus citri*, Rossi, *Melanitis leda*, L., *Sesamia calamistis*, Hmp., *Argyroploce leucotreta*, Meyr., *Minthea rugicollis*, Wlk., *Carpophilus dimidiatus*, F., and *Euxoa spinifer*, Hb. *Papilio demodocus*, Esp., and various Coccids have occurred as minor pests of *Citrus*, while *Trioza* sp. has only been injurious to seedling plants. *Acraea acerata*, Hew., *Cylas formicarius*, F., *Aspidomorpha quinquefasciata*, F., and *Herse convolvuli*, L., occurred on sweet potatoes. *Cosmopolites sordidus*, Germ., and *Diaphone eumela*, Cram., were found on bananas.

Pests of trees include: on *Erythrina*, *Urota sinope*, Westw., parasitised by *Sericophoromyia quadrata*, Wied.; on *Grevillea robusta*, *Termes* (?) *bellicosus*, L.; on *Cassia floribunda*, *Xyleutes capensis*, Wlk.; on *Chlorophora excelsa*, *Phytolyma lata*, Wlk.; on *Bridelia micrantha*, *Acraea perenna*, Dbl.; and on young forest trees, *Brachytrypes membranaceus*, Dru. On castor oil plants, *Arctornis producta*, Wlk., *Notolophus* (*Orgyia*) *georgianus*, Faw., *Nudaurelia dione*, F. and *Zebronia phenice*, Cram., were found.

Pests of minor crops included: on mustard, *Belenois* (*Pieris*) *zochalia*, Boisd.; on coca, *Rhodogastria atrivena*, Hmp.; on onions, *Diaphone eumela*, Cram., and *Euxoa spinifer*, Hb.; on beans, *Antheua simplex*, Wlk., and *Catochrysops malathana*, Boisd.; on guava, *Bunaea phaedusa*, Drury, and *Aspidiotus destructor*, Sign.; on cucurbits, *Hyperacantha castanea*, Allard, and *H. collaris*, Weise; and on radish, *Phyllotreta mashonana*, Jac.

Coccotrypes dactyliperda, F., was found boring in buttons of vegetable ivory, and the garments to which the buttons were attached were also attacked after the buttons had been destroyed. *Tenebroides mauritanicus*, L., and *Tribolium castaneum*, Hbst., were found in cinnamon from Zanzibar; *Carpophilus hemipterus*, L., in cloves from Zanzibar; and *Coccotrypes pygmaeus*, Eichh., in seeds of *Anona musesi* from the Belgian Congo.

SANDGROUND (J.). **A Study of the Life-history and Methods of Control of the Root Gall Nematode,** *Heterodera radicicola* **(Greef Muller), in South Africa.**—*S. African Jl. Sci.*, xviii, no. 3–4, pp. 399–418, 3 plates. Johannesburg, June 1922.

The Nematode, *Heterodera radicicola*, which attacks many plants of economic importance (a list of 46 species being given) is described as occurring in South Africa, and the stages illustrated. The life-history and habits are discussed [*R.A.E.*, A, viii, 401], only two ecdyses being recognised by the author, instead of four or five as mentioned by earlier writers. It is thought that the species infesting potatoes, from which the present study was chiefly made, may be different from that attacking tomato and other plants. Remedial measures are reviewed. As desiccation is fatal to this Nematode in all its stages, the powerful sun in Africa destroys many individuals, and its influence can be increased by frequent ploughing and by the use of unslaked lime in large quantities. Further investigations are suggested into resistant varieties of plants.

COLEMAN (L. C.). **Report of Work done in the Entomological Section.**—*Mysore State Dept. Agric., Rept. 1919–20,* pt. ii, pp. 64–65. Bangalore, n.d. [Received 21st November 1922.]

Work on *Amsacta albistriga,* a serious pest of non-irrigated crops, was continued as in previous years. The most effective remedial measure is hand-picking the caterpillars before the first brood emerges. *Scirpophaga auriflua, Sesamia* sp. and *Diatraea* sp. are common sugar-cane pests in Mysore, the latter being the most injurious. *Sesamia* sp. is a common pest of jola (*Andropogon sorghum*), and *S. auriflua* infests the common elephant grass (*Cyperus* sp.) as an alternative host. Egg-parasites of *S. auriflua* and *Diatraea* sp. were found, and a larval parasite of the latter. The trapping of adults in trash heaps was only fairly successful; early planting gives the best control.

Four parasites of *Idiocerus* spp. (mango hoppers) were obtained, but none has proved effective, and spraying is not practically feasible. Coffee pests are *Coccus viridis colemani,* which has ceased to be a serious pest owing to parasitic fungi, and *Xylotrechus quadripes,* against which Brunolineum in 80 per cent. strength is more effective than Brunolineum plantarium, while neither chemical injures the tree in any way. Experiments are in progress to control *Oryctes rhinoceros* by treatment of its breeding-places. The larval stage is passed in refuse and manure heaps, and pupation occurs in the ground at a depth of about six inches. Experiments are also being made to ascertain if *Calandra oryzae* (rice weevil) can be controlled in the same manner as Bruchids attacking stored pulses [*R.A.E.*, A, viii, 65].

DICKSON (B. T.). **Studies concerning Mosaic Diseases.**—*Macdonald College, Canada,* Tech. Bull. 2, 125 pp., 8 plates. 1922. (Abstract in *Rev. App. Mycol.*, i, no. 11, pp. 392–394. Kew, November 1922.)

In the course of this study, *Acyrthosiphon* (*Macrosiphum*) *pisi,* Kalt. (pea aphis), was shown to transmit mosaic disease between *Trifolium pratense, T. hybridum, T. repens, T. incarnatum* and *Medicago lupulina,* and also in one case from *T. pratense* to *Medicago sativa* (lucerne). Raspberry mosaic is also transmitted by Aphids, probably *Aphis rubiphila,* Patch [*cf. R.A.E.*, A, x, 244, 459].

PARKER (T.). **The Suppression of Insect Pests and Fungoid Diseases. I. The Fumigation of Malthouses.**—*Bur. Bio-Technology,* Bull. 7, pp. 229–234. Leeds, October 1922.

Malt stored in cold bins is never affected by *Trogoderma khapra,* Arr., infestations only appearing where the temperature approximates to 90°–110° F. Generally speaking the greatest infestation occurs round the walls adjoining the kiln or kiln shafts. The larvae migrate from one part of the building to another, but so far have not been observed on barley floors. Fumigation of the whole premises is the best remedy, though it is difficult to remove all the malt and leave the premises vacant for two or three weeks. Once the pest has been cleared out it should be prevented from re-establishing itself, and floors, walls, ceilings and corridors should be proofed with an impervious surface. The floors should preferably be made of asphalt; all brick-work, ceilings, partitions and walls should be scraped to remove lime-wash and any loose material; any cracks and crevices should be opened out and in the case of brickwork filled with a special fluosilicated

asbestos compound and cracks in wooden partitions filled with a special bitumastic filling compound. All walls should be washed down and all surfaces painted with disinfectants. Emphasis is laid on the importance of not allowing this beetle to become a serious pest before carrying out a system of control.

HALL (W. J.). **The Outbreak of** *Pseudococcus sacchari*, **Ckll., on the Sugar-cane of Egypt.**—*Minist. Agric., Egypt, Tech. & Sci. Service*, Bull. 26, 16 pp., 1 table. Cairo, 1922.

The history of the cultivation of sugar-cane in Egypt is reviewed. With the increased abundance of *Pseudococcus sacchari*, Ckll. (sugar-cane mealy bug) since 1918, the whole future of the industry is affected. The insects are usually found immediately below the node, and when they migrate, they move to higher nodes. They are unable to migrate to the most tender growth near the growing point, because of the extremely close adherence of the leaf-sheaths, beneath which they cannot penetrate. The only individuals found at places other than below the node are the young females migrating to more congenial feeding places in which to complete their life-cycle. The insect not only injures the cane, but indirectly through the production of gum has far-reaching results on the available sugar content. An experiment proved that honey dew reduced and even inhibited crystallisation.

Experiments in treating cane before planting, so that the insects should be killed without the germination being affected, are described. Immersion for 20 seconds in carbon bisulphide was effective, but as this substance is extremely inflammable it would be dangerous to handle in large quantities. An emulsion consisting of 2 gals. paraffin or petroleum, 1 gal. water and 1 lb. sunlight soap, at a dilution of 1 in 30, killed every insect after immersion for two minutes. All sets must be stripped of the leaf-sheaths before immersion, and the process must not be carried out on the field to be planted out, but on that in which the cane originates. In view of the severity of the present outbreak, sugar-cane should only be grown for two years on any field. If it is essential to use trash as fuel, it should be compressed into bales and not transported loose. As an alternative, *Sesbania aegyptiaca*, which has a high calorific value, may be grown round the fields. No trash should be removed from the field, but the whole land should be thoroughly burnt after harvest. The only other food-plant is *Saccharum aegyptiacum*, but this is not commonly found near cane fields. So far as possible, large areas should be planted simultaneously with cane, as first, second and third year cane in close proximity means an endless chain of infestation.

Owing to the difficulty of the universal adoption of these remedial measures, the author suggests that the Sugar Company should provide the growers with clean sets free of charge or increase the price paid for clean cane, and further that the Government should decree that no sets other than those obtained from and certified clean by the Sugar Company are to be planted in big sugar-cane growing areas.

The only natural enemies that have been found useful are rats, a green fungus, *Aspergillus flavus*, with which was found associated *A. niger*, and a white fungus, which may possibly be another stage of the green fungus. These can only be considered as subsidiary controls, as they come into action only when the infestation is heavy. A cockroach, *Phyllodromia treitliana*, Werner, Collembola and ants have been

observed, but are probably of no economic importance as regards control. Arrangements have been made to import the predacious Coccinellid, *Cryptolaemus montrouzieri*, Muls., from the south of France.

FRANK (A.). **The Strawberry Root Weevil.**—*Bi-Mthly. Bull. Washington Agric. Expt. Sta.*, x, no. 4, pp. 81–86, 2 figs. Puyallup, Wash., November 1922.

Otiorrhynchus ovatus is the most serious strawberry pest in western Washington and becomes more abundant each season. A brief account of its life-history is given and of the principal remedial measures, which include barriers, autumn cultivation, rotation of crops, the use of poultry, trapping, fumigation and the use of chemicals. Other insects attacking strawberries are *O. sulcatus*, *O. rugifrons*, *Aegeria* (*Synanthedon*) *rutilans*, *Aristotelia fragariae*, *Lygus pratensis*, *Tetranychus bimaculatus*, *Ancylis comptana*, *Tylenchus dipsaci*, *Polyphylla decemlineata*, *Lachnosterna* and wireworms.

WATSON (J. R.). **Additions to the Thysanoptera of Florida, X.**—*Florida Ent.*, vi, no. 2, pp. 21–23. Gainesville, Fla., September 1922.

Of the species dealt with, those of economic interest are *Megalomerothrips eupatorii*, Watson, in cottony cushion scale [*Icerya purchasi*, Mask.] on which it may be predacious; *Dictyothrips floridensis*, Watson, on guava and other plants, and probably an introduced species; *Heliothrips gowdeyi*, Hood, in *Bidens* blossoms; *Haplothrips humilis*, Hood, on Compositae; *H. merrilli*, Watson, under cap scales of coconuts; *Zygothrips floridensis*, sp. n., described from a single female taken on an unknown shrub; *Cryptothrips laureli*, Mason, on all species of *Tamala*; and *Symphyothrips punctatus*, Hood & Williams, and *Hindsiana cocois*, Watson, on mango and coconuts, the latter probably being predacious.

[WATSON (J. R.)]. **The Greenhouse Thrips out-of-doors in North-eastern Georgia.**—*Florida Ent.*, vi, no. 2, p. 23. Gainesville, Fla., September 1922.

Heliothrips haemorrhoidalis was taken at an altitude of 2,000 ft. on a wild shrub during August in Georgia. The place and circumstances of its capture point to it being a native of that region, living out of doors all the year round, and that so far as cold is concerned, it could do so over a large portion of the United States. This thrips has hitherto only been found in greenhouses or in their immediate vicinity during the summer, except in south Florida. As its native range extends further north than had been suspected, it was probably not imported from the tropics, but originally entered greenhouses from some local wild food-plant.

SMITH (G. A.). **Report of the Superintendent of Moth Work.**—*Ann. Rept. Massachusetts Commiss. Conserv. & State Forester, Year ending 30th November 1921*, pp. 50–55. Boston, Mass., 1921. [Received 24th November 1922.]

The infestation of gipsy moth [*Porthetria dispar*, L.] was less severe than in 1920 [*R.A.E.*, A, x, 31], although in a few towns there are heavy egg deposits. The conditions in the various divisions surveyed are briefly reviewed. Owing to reduction in the grant for Federal

work, some of the field activities had to be suspended for a time, resulting in a considerable spread of infestation. Introduced parasites were found in many areas, but, generally speaking, they were not abundant enough for effective control. Arrangements have now been made to send experts to Europe and Japan to make further studies of the natural control of the pest in those countries and to send back as much parasitised material as possible.

Report of the Division of Plant Pest Control.—*Ann. Rept. Massachusetts Dept. Agric., Year ending 30th November 1921*, pp. 107–117. Boston, Mass., 1921. [Received 24th November 1922.]

The inspection work of the year is reviewed. Coccid infestation has been greatly reduced by the practice of destroying infested plants, spraying, and the introduction of parasites. Oyster-shell scale [*Lepidosaphes ulmi*] is common and widespread, chiefly on lilac, willow and poplar. Spraying in mid-June, when the eggs hatch, is the best remedy, although the thick foliage at that time renders the operation difficult. Spraying with lime-sulphur in winter or early spring is also said to be effective. Other insects dealt with include satin moth [*Stilpnotia salicis*] [*R.A.E.*, A, ix, 574], juniper webworm [*Dichomeris marginellus*, F.] [*R.A.E.*, A, ix, 434], brown-tail moth [*Nygmia phaeorrhoea*, Don.], of which the nests were scarce ; European corn borer [*Pyrausta nubilalis*, Hb.], the quarantine against which is proving very effective in checking new outbreaks ; and corn ear worm [*Heliothis obsoleta*, F.], which was very prevalent.

Quarantine Proclamation No. 99.—Extract from *Commonwealth of Australia Gaz.*, no. 81. Melbourne, 5th October 1922.

This proclamation of the 4th October 1922 repeals one published on the 26th January 1922, and prohibits the importation into Australia of bees and used or secondhand hives from all countries of the world, except the United States of America and Canada.

Tanganyika Territory : The Plant Pest and Disease (Coconut) Regulations, 1922.—Govt. Notice no. 199, 2 pp. Dar-es-Salaam, 19th September 1922.

These regulations are published under the powers of Ordinance No. 38 of 1921 [*R.A.E.*, A, x, 95]. They provide for the destruction of crowns and all diseased parts of coconut plants by fire and the burial of stems and stumps. Powers are given for cultural or destructive measures in the case of infested plants or those exposed or liable to infestation. All crowns should be periodically cleaned. Permission may be granted for the storage of dung, etc., for agricultural and coir for manufacturing purposes, but dead coconut palms or plants, rubbish heaps and accumulations of dung, vegetable refuse, etc., are to be destroyed as likely breeding-places. The use of stems of coconut plants, except sawn coconut board for internal construction, is prohibited in building or construction work. Powers are given to prohibit the removal of plants or parts of plants. The construction and maintenance of beetle traps may be demanded of owners of coconut plantations.

Fletcher (T. B.) & Inglis (C. M.). **Some Common Indian Birds. No. 17. The Pied Mynah** (*Sturnopastor contra*).—*Agric. Jl. India*, xvii, pt. 5, pp. 441–444, 1 plate. Calcutta, September 1922.

The pied mynah (*Sturnopastor contra*), while decidedly more vegetarian in diet than the common mynah, and feeding frequently on *Ficus* spp., and cereal crops, is considered on the whole decidedly beneficial, as throughout the year it destroys grasshoppers, crickets, caterpillars, ants and other insects, while the young are fed entirely on insect food. It is protected under the Wild Birds Protection Act in the United Provinces, Bengal and Assam.

Restrictions on Import of Plants and Seeds into India.—*Agric. Jl. India*, xvii, pt. 5, pp. 511–515. Calcutta, September 1922.

Under the terms of the Indian Destructive Insects and Pests Act, 1914, an Order has been issued, dated 26th June 1922 (Notification No. 580–24Q) for the purpose of prohibiting, regulating and restricting the import into British India of certain specified produce. Some of the provisions are additional to orders previously noticed [*R.A.E.*, A, vi, 87]. The importation of sugar-cane into British India by sea from any other country is prohibited, unless it is accompanied by a certificate declaring that it is free from cane borers, scale-insects, *Aleurodes*, mosaic and certain other diseases. Restrictions are also placed on the importation of seeds and plants of coffee and rubber (*Hevea*), and seeds of flax, berseem [*Trifolium alexandrinum*] and cotton. A schedule is annexed that sets forth the authorities from which the necessary certificates may be obtained, according to the country of origin.

Garman (H.) & Jewett (H. H.). **The White Flies of Hothouses** (*Asterochiton abutilonea* **and** *A. vaporariorum*).—*Kentucky Agric. Expt. Sta.*, Bull. 241, pp. 76–111, 10 figs. Lexington, Ky., April 1922.

Trialeurodes (*Asterochiton*) *vaporariorum* and *T.* (*A.*) *abutilonea* have been present in great numbers in Kentucky greenhouses, rendering many plants unsightly and valueless. The latter is probably a native insect, occurring out of doors on the common weed, *Abutilon theophrasti*. The numbers increase slowly from January to April, after which there is a marked increase, which lasts until the autumn, many greenhouse and outside plants being attacked, especially tomato, cucumber and musk-melon. Detailed records of the life-history are given, showing the average length of a generation to be 32 days (varying from 21 days in summer to 41 in winter), breeding being continuous throughout the year. The stages are described. A Hymenopterous parasite, *Encarsia pergandiella*, oviposits in both larvae and pupae, but is not sufficiently numerous to act as an effective check. An unidentified fungus also clears off some of the larvae and pupae.

The results are given of experiments made with many fumigants, including potassium cyanide, sodium cyanide, paradichlorobenzene alone and with acetone or carbon tetrachloride, and with the contact insecticides kerosene emulsion and whale-oil soap. Hydrocyanic acid gas proved a satisfactory fumigant. The eggs are not greatly affected by doses that do not injure the plants, and therefore fumigation should be carried out two or three times at 10-day intervals. In an airtight box, 8 or 9 mgm. of potassium cyanide per cu. ft. did not

injure tomato plants with 15 hours' exposure ; rather more could be used in a greenhouse, which is not quite airtight. If sodium cyanide is used, one-third only of the quantity is necessary. When fumigation is impracticable, frequent spraying with soap solutions, using 1 or 2 oz. of soap in a gallon of water, will do much to reduce the numbers.

Departmental Activities: Entomology.—*Jl. Dept. Agric. Union S. Africa*, v, no. 5, pp. 397–398. Pretoria, November 1922.

For insects such as the woolly aphis [*Eriosoma lanigerum*, Hausm.] and fig-tree mealybug [*Pseudococcus filamentosus*, Ckll.], that winter in small colonies on the trees, a remedy frequently suggested is to dab the colonies with certain insecticides, such as raw linseed oil (for woolly aphis). A warning is given against painting over the tree, as this chokes the lenticels and produces injury, or even death. Cockchafers have been particularly abundant in apple orchards and on other fruit tress. The beetles should be persistently dealt with while on the trees, by jarring them into a receptacle containing water and oil, which should be done by the light of a lantern in the evening, or by keeping the trees well covered with lead arsenate, using 4 oz. paste or 2 oz. powder in 4 gals. water. Collecting the beetles by daylight from their hiding-places in the soil is slow and laborious. Cluster bugs (*Agonoscelis* spp.) are best dealt with by brushing them off the trees into a tin of water with a little paraffin oil in it. Success has been obtained against Jassids on cotton by following autumn and winter ploughing by bare fallow, until the crop is planted in the following spring. Early spring planting will then result in vigorous growth before the Jassids' attack. For cotton-stainers [*Dysdercus* spp.], a ploughed barrier or a strip burned off around the fields resulted in their being practically free, while neighbouring fields were badly infested. Wheat aphis [*Toxoptera graminum*, Rond.], which is not a serious pest every year, was troublesome. The wheat should be kept as healthy as possible, especially during the winter. If the attack is severe in patches, it is advisable to burn these over, and if the whole field appears to be threatened, it should be used for grazing.

Service and Regulatory Announcements, January–June 1922.—*U.S. Dept. Agric.* Fed. Hortic. Bd. no. 72, pp. 1–99. Washington, D.C., 27th October 1922.

Revised rules and regulations are quoted, effective on and after 1st May 1922, supplemental to Quarantine No. 52 [*R.A.E.*, A, x, 594], regarding the pink bollworm [*Platyedra gossypiella*, Saund.]. These regulations are merely necessitated by the revision of the quarantined districts, a minor change being made to permit the movement of seed prior to disinfection from one regulated area to another. Regulations that have been promulgated for governing the planting, growing and marketing of cotton produced in regulated zones and prescribing means of disinfecting the seed are quoted. The report on scouting for pink bollworm during 1921 records, as the most alarming feature, the wide distribution of infested seed from Carlsbad, New Mexico, before infestation was discovered there. Special attention was given to the localities receiving this seed, with the result that only two light infestations were discovered. Brief reports from the various infested areas show that outbreaks were discovered in 67 cotton fields during the season, 52 being in Texas, 7 in New Mexico, and 8 in Mexico. The heaviest infestations were in western Texas. Regulations have been

made under a Congress Resolution for utilising a proportion of the grant for eradication of the pest in reimbursing farmers for losses due to enforced non-production of cotton. A report on the cleaning of cotton fields during 1917–21 is included, and the field inspection plans for 1922 are discussed.

Quarantine No. 43, on account of the European corn borer [*Pyrausta nubilalis*, Hb.] is revised for the second time, the new regulations becoming effective after 1st May 1922, and making it possible to limit the quarantine to the areas in the States actually designated as infested, conditionally upon the enforcement of a State quarantine adequate to prevent spread within the State. The States now having infested areas are Massachusetts, New Hampshire, New York, Pennsylvania, Ohio and Michigan. All except the last two have already established State quarantines.

By Amendment No. 3 to Quarantine No. 45 against the gipsy moth [*Porthetria dispar*, L.] and the brown-tail moth [*Nygmia phaeorrhoea*, Don.], the quarantine against the former is extended to cover the whole State of Massachusetts, 67 towns in Connecticut, 13 in Maine, 2 in New Hampshire, and 11 in Vermont, while 7 in the last three States are removed from quarantine. More than 2,300 square miles are freed from quarantine for *N. phaeorrhoea*, making a total reduction of more than 50 per cent. since 1914.

SIDENIUS (I. E.). **Verslag van het Deli Proefstation over 1 Juli 1921–30 Juni 1922.** [Report of the Deli Experiment Station from 1st July 1921 to 30th June 1922.]—*Meded. Deli Proefst.*, 2nd Ser. no. 24, pp. 1–38. Medan, 1922.

An investigation of various arsenical insecticides was carried out during the year. It is necessary to differentiate between treatment of tobacco in seed-beds and tobacco in the field. For the former the object is to cover the seedlings as completely as possible with a lasting coat of the insecticide, while in the latter the leaves must be sprayed with insecticides that disappear during the drying, fermentation and sorting of the leaf. As the previously used mixture of 2 per cent. lead arsenate and 3 per mille soap scorched the seedlings, further tests were made. An excess of alkali in the soap is injurious, and the soap may be dispensed with if the sprayer is a good one and the spray is carefully applied. Furthermore a strength of 1 per cent. lead arsenate seems preferable in every way to the former strength. To protect the whole plant against the attacks of caterpillars a trial was made with dipping the entire seedlings (except the roots) in the solution. This treatment appeared to be more effective and the plants were not damaged by it. As regards field tobacco, dusting may prove more suitable than spraying. A comparison between Paris green, lead arsenate, calcium arsenate and zinc arsenite showed the first-named to be the most effective but also the most liable to scorch. No definite conclusion as to the best preparation for local conditions was reached. The trap-bed system was used in many plantations, a total of 844 beds being arranged. An average of 500 Lepidopterous larvae was taken on a bed (maximum 2,588, minimum 36), but no advantage was noticed in the field, and the assemblage of all kinds of injurious insects in the beds is a danger unless the pests are eradicated at the proper time.

Various insecticides were unsuccessfully tried against Aphids, but a solution containing 0·2 per cent. of pure nicotine and 0·25 per cent. lysol gave satisfactory results.

Insect Pests—*34th Ann. Rept. S. Carolina Expt. Sta. (for Year ended 30th June, 1921)*, pp. 29–36, 2 figs. Clemson College, S.C., December 1921. [Received 29th November 1922.]

Wireworms cause considerable losses in South Carolina [*cf. R.A.E.*, A, iii, 693, 709; viii, 5, 509], particularly the two destructive species of the coast and near-coast counties, while investigations are also being made regarding another species in the low lands of the central part of the State. Experience has shown that they can be controlled by increasing the humus content of the soil and by the use of suitable cover crops and summer legumes.

Studies on the correlation between red spider and weather conditions indicate that outbreaks of this pest may be expected to be more general and more severe during a season following a very cold winter, the mites being able to survive much lower winter temperatures than their insect parasites. The existence of winter food and spring colonisation plants, such as long-stemmed violet and poke weed, is an important factor in developing outbreaks. The cotton root aphis [*Aphis maidiradicis*, Forbes] is a serious pest throughout the greater part of the State, being protected by ants, which transfer the Aphids to the roots of winter food-plants, which are connected with the ant burrows by underground channels. It was found that a successful winter cover crop eliminates these winter food-plants from the cotton field and greatly delays spring re-colonisation. This practice, supplemented by frequent early shallow cultivation, which confuses the ant trails, reduces the losses from this pest to insignificance.

Temperature and moisture seem to be the determining factors of insect activities, and, with a better knowledge of these relationships, it is hoped in the future to check a pest by eliminating conditions favourable for successful wintering, to anticipate the severity of an impending invasion under known conditions of weather and parasitism, and to determine when, where and on what crops the outbreak will take place. Studies on high and low fatal temperatures have determined the best conditions under which to fumigate stored products, and to destroy insects by high temperatures.

The cotton-boll weevil [*Anthonomus grandis*, Boh.] now occurs throughout the State, and if cotton is to continue to be grown it must be done in accordance with the improved practices developed by the more southern states to meet the same conditions.

Against the peach-tree borer [*Anarsia lineatella*, Zell.] the usual remedies have been the mounding methods combined with trunk washes. Investigations are now being made of the effects of paradichlorobenzene and the best methods of using this fumigant. Australian Coccinellids [*Novius cardinalis*, Muls.] are being successfully used in the control of cottony cushion scale [*Icerya purchasi*, Mask.]. The Argentine ant [*Iridomyrmex humilis*, Mayr] is being successfully controlled by the poison formula recommended by the U.S. Bureau of Entomology [*R.A.E.*, A, viii, 285].

Bee culture in the State is reviewed.

Pratt (B. G.). **Nature and Action of Oil Sprays.**—*Better Fruit*, xvii, no. 5, pp. 10, 11, 19, 20. Portland, Oregon, November 1922.

The preparation, general nature and action of miscible oil sprays are explained. They are of two kinds, one containing from 18–20 per cent. of vegetable oils, the other, not over 5 per cent., or even none. The more vegetable oils they contain the more expensive they

are to make, but the vegetable oils seem to have beneficial properties that make them worth the difference. These oils are generally used as dormant sprays, but a warning is given against employing them when the temperature is below 40° F., or when there is danger of frost before they have time to dry thoroughly on the tree.

TURATI (E.) & ZANON (V.). **Materiali per una faunula lepidotterologica di Cirenaica.** [Materials for a Fauna of the Lepidoptera of Cyrenaica.]—*Atti. Soc. Ital. Sci. Nat.*, lxi, no. 2, pp. 132–178, 5 figs., 1 plate. Milan, October 1922.

Among the Lepidoptera found at Bengasi, the following are injurious to fruit trees and cultivated plants. *Hellula undalis*, F., has been found to be a very serious cabbage pest. In 1916 nearly all the cauliflowers were destroyed by this moth. It is absolutely necessary that the stumps should be uprooted and burned; light traps should also prove useful. A parasite, believed to be a Braconid, was bred from the pupae. *Papilio machaon* is injurious to fennel; *Pieris brassicae catolema*, Roeb., and *Leucochloë albidice*, Ober., to cabbages; *Colias crescens* to *Medicago sativa* (lucerne); *Pyrameis cardui*, L., to cardoons and artichokes; *Acherontia atropos*, L., to *Solanum melongena* (egg-plant) and olives, the latter being a new and important fact; *Deilephila nerii*, L., to oleander; *Hippotion celerio*, L., to grape vine; *Earias insulana anthophilana*, Snell., to cotton and *Hibiscus esculentus*; *Euxoa segetum*, Schiff., to lettuce and peppers; *Feltia* (*E.*) *exclamationis*, L., to various vegetables; *Agrotis* (*Rhyacia*) *ypsilon*, Rott., to lettuce; *A. pronuba*, L., to various vegetables; *Triphaena fimbria*, L., and *Trigonophora meticulosa*, L., to lettuce; *Barathra brassicae*, L., to peas; *Xylina exoleta*, L., to peas and flax; *Laphygma exigua*, Hb., to young peppers and other vegetables; *Phytometra gamma*, L., to lettuce and carnations; *Anua tirrhea*, C., to pomegranate; *Ephestia kühniella*, L., to *Ricinus* (castor-oil plant); *Centophila isidis*, L., to *Acacia farnesiana*; *Pyrausta nubilalis*, Hb., to maize; *Cydia* (*Carpocapsa*) *pomonella*, L., to peach and apricot fruits; *Hemerophila* (*Simaethis*) *nemorana*, Hb., to fig foliage; *Plutella maculipennis*, Curt., to maize and various vegetables; and *Sitotroga cerealella*, Oliv., to stored barley.

LAVEZZINI (V.). **Per la ricostruzione dei vigneti fillosserati.** [Regarding the Replanting of Vineyards infested with *Phylloxera*.]—*Riv. Agric.*, xxvii, no. 47, p. 700. Rome, 24th November 1922.

The rules to be followed in replanting vineyards with American stocks are briefly enumerated, and a list is given of the varieties of vines suitable for the various soils.

Note pour la préparation de jus de tabac à employer comme insecticide aux colonies.—*Agron. colon.*, no. 58, pp. 334–335. Paris, October 1922.

A simple method of preparing a nicotine solution is as follows: Nearly mature tobacco leaves of low quality or parts of such leaves are dried, if possible in the sun, until they approximate to the commercial leaf as regards desiccation. They are then soaked for 1–2 days in water, 6 gals. to 5 lb. of leaves. This must be stirred from time to time, and after the liquid has been drained off, the fluid obtained

by pressing the leaves must be added to it. With average leaves the liquid thus produced is of suitable strength for employment as an insecticide. As it ferments readily, it should not be prepared long before use.

BECKERICH (A.). **La défense des vignobles contre les maladies par les bouillies sulfocalciques, insecticides et fongicides.**—*Progrès agric. & vitic.*, xxxix, no. 48, pp. 522-526. Montpellier, 26th November 1922.

The lack of definite formulae has prevented lime-sulphur sprays from being widely adopted by fruit growers in France. The high cost of copper has now led vine growers to use them as a substitute for copper and sulphur with encouraging results, while recent progress in the preparation of polysulphides and the availability of tested spray formulae eliminate many previous difficulties. These solutions act as stomach as well as contact insecticides.

NOTMAN (H.). **A New Genus and Species of Weevil from Texas (Coleoptera).**—*Jl. N.Y. Ent. Soc.*, xxx, no. 3, pp. 128-129. Lancaster, Pa., September 1922.

Zeugonyx sabinae, gen. et. sp. n., here described, was bred from oval swellings in twigs of mountain cedar (*Sabina sabinoides*) collected in Texas.

VERESHTCHAGIN (B.). **Statiunea Bio-Entomologică din Chişinău. Istoricul şi activitatea ei, în timp de 8 ani (1911-1918).** [Kishinev Bio-Entomological Station. The History of its Activities from 1911-1918.]—*Viata Agricola*, xii, no. 3, pp. 78-89. Bucharest, 1st February 1921. [Received 24th November 1922.]

In 1918 the station was fully equipped for entomological and mycological work, and campaigns against agricultural pests were organised. The pests occurring in Bessarabia are arranged under the crops attacked.

Vine pests are *Clysia* (*Conchylis*) *ambiguella*, Hb., *Lethrus apterus*, Laxm., and *Phylloxera vastatrix*, Planch.

Eriosoma (*Schizoneura*) *lanigerum*, Hausm., is one of the chief orchard pests in the south of Bessarabia. Others occurring in various parts of the country are *Physokermes coryli*, Ldg., on plums; *Aspidiotus ostreaeformis*, Curt., on pears and plums; *Lepidosaphes ulmi*, L., on apples; *Psylla pyricola*, Forst., on pears; *Stephanitis* (*Tingis*) *pyri*, F.; *Aphis pomi*, DeG.; *Hyalopterus pruni*, F.; and the weevils, *Sciaphobus squalidus*, Scop., *Rhynchites pauxillus*, L., *R. bacchus*, L., *Anthonomus pomorum*, L., and *A. cinctus*, Koll., the last named causing great damage by laying its eggs during the autumn and winter in the flower buds of pears. The larvae of *Aporia crataegi*, L., and *Nygmia phaeorrhoea*, Don. (*Euproctis chrysorrhoea*, L.) were very abundant in 1913-14; *Coleophora* sp. on plums in 1914; *Cheimatobia brumata*, L., in 1915-17; and *Hyponomeuta malinellus*, Z., in 1916. *Cydia* (*Carpocapsa*) *pomonella*, L., and *Hoplocampa fulvicornis*, Klug, are annual pests.

The field pests recorded are *Oscinella* (*Oscinis*) *frit*, L., *O. pusilla*, Meig., *Mayetiola* (*Cecidomyia*) *destructor*, Say, *Lema melanopa*, L., *Melolontha melolontha*, L., *Amphimallus soltitialis*, L., *Rhizotrogus aequinoctialis*, Hbst., *Athous niger*, L., *Epicometis* (*Tropinota*) *hirta*,

Poda, and *Anisoplia austriaca*, Hbst. During 1915 great damage was caused by *Loxostege (Phlyctaenodes) sticticalis*, L. During 1916–17 *Zabrus tenebrioides*, Goeze, was recorded; *Otiorrhynchus ligustici*, L., occurred on lucerne; and *Athalia colibri*, Christ. (*spinarum*, F.), *Meligethes aeneus*, F., *Baris chloris*, F., and *Entomoscelis adonidis*, Pall., on rape.

Vegetable pests are *Pieris brassicae*, L., and *Barathra (Mamestra) brassicae*, L. *Calandra granaria*, L., and *Plodia interpunctella*, Hbst., caused damage in stored products.

The work of the station included numerous experiments with insecticides. Great success was obtained with a mixture of 33 lb. sulphur, 33 lb. unslaked lime and 100 gals. water against Coccids. The best spray for *Lema melanopa*, L., was found to be 2 lb. Paris green and 4 lb. unslaked lime in 100 gals. water. Experiments with other insecticides show that the most effective was 2 lb. London purple, 4 lb. unslaked lime and 100 gals. water, which killed 100 per cent. A 3 per cent. solution of California mixture [*R.A.E.*, A, iii, 215, 396] caused severe scorching of the leaves.

RAMIREZ (R.). **Chinche del Durazno.** [The Peach Bug.]—*Rev. Agric.*, vii, no. 6, p. 326, 2 figs. S. Jacinto, Mexico, October 1922.

A Tingid bug, *Corythuca spinosa*, causes the foliage of peaches to turn yellow, and a severe infestation may kill the trees; but if the attack is checked in time with petroleum emulsion, no harm results.

TROUVELOT (B.). **Sur la présence en France d'un nouvel ennemi des arbres fruitiers,** *Laspeyresia molesta*, **Busck. (Lep. Tortricidae.).**—*Bull. Soc. ent. France*, 1922, no. 15, pp. 220–223. Paris, 1922.

Cydia (Laspeyresia) molesta, Busck, was observed for the first time in France in the summer of 1922, attacking peaches. It is thought that this moth has probably been present since 1919. The rapidity with which it is increasing in the district, the number of generations and the difficulty of controlling it render its presence a serious menace to the fruit production of the south, and perhaps of the whole of France. The chief parasite in America is the Chalcid, *Trichogramma* sp., which destroys as many as 80 per cent. of this Tortricid, and it is hoped that in France indigenous parasites will quickly adapt themselves to it. A short account of its biology, quoted from Japanese and American sources, is given.

FALCOZ (L.). **Notes biologiques sur divers Insectes des environs de Vienne en Dauphiné.**—*Bull. Soc. ent. France*, 1922, no. 15, pp. 223–228. Paris, 1922.

The locust, *Calliptamus (Caloptenus) italicus*, L., was very numerous in 1921 and 1922 in Isère and caused serious damage to cultivated crops. A similar invasion occurred in the Lyons region in 1906. Among Hymenoptera, the sawfly, *Hoplocampa brevis*, Klug, seriously damaged pears, sometimes to the extent of 25 to 30 per cent. of the fruit, which turned black and dropped soon after the exit of the larvae, about 20th May. Infested fruits should be gathered before this date, and destroyed with the larvae in them. The larvae of *Macrocephus xanthostoma*, Eversm., bore in the stems of *Poterium sanguisorba*. Towards mid-June, a cocoon is constructed in the main stem, where

the larva passes the winter. Pupation occurs towards the end of April and the adult emerges early in May. The larvae are frequently parasitised by an Ichneumonid, *Pimpla inquisitor*, Scop.

Coleopterous pests include *Coraebus sinuatus*, Creutz, which oviposits on the larger roots of *Poterium sanguisorba* in July, the larvae tunnelling in the bast and inner layers until May when pupation occurs, the adults appearing in June. Larvae of the Curculionid, *Lixus punctiventris*, Boh., were found inhabiting *Barkausia taraxacifolia*. Oviposition occurs in the stem, and the larva gradually descends to the root, where it pupates in June, adults emerging in early July. Both larvae and pupae are parasitised by an Ichneumonid of the genus *Ephialtes*. *Ceuthorrhynchus quercicola*, Payk., produces galls on *Fumaria officinalis* in Dauphiné; *C. mixtus* and *C. nigrans* replace this species in the Mediterranean region. *Galerucella luteola*, Müll., is increasingly destructive to elms, none of the usual parasites being present in the region; the predators, *Lebia scapularis*, Fourc., *Coccinella conglobata*, L., and larvae of *Chrysopa* are abundant, but are not an effective check.

GAUTIER (C.). **Description d'une nouvelle espece de** *Praon*. **(Hym. Braconidae, Aphidiinae.)**—*Bull. Soc. ent. France*, 1922, no. 16, pp. 239–241. Paris, 1922.

Praon lemantinum, sp. n., is described from individuals found in August parasitising Aphids living on *Galeopsis tetrahit*.

DE JOANNIS (J.). **Note sur la chenille de** *Platyedra vilella*, **Z. (Lep. Gelechidae.)**—*Bull. Soc. ent. France*, 1922, no. 16, pp. 247-250, 1 fig. Paris, 1922.

In consequence of the importance of *Platyedra* (*Depressaria*) *gossypiella*, Saund., as a cotton pest in the United States, a study has been made of species allied to it. Search was made in France for the larval stage of *P. vilella*, Z., in the fruits of Malvaceae, and these were finally found in Morbihan, infesting flowers of *Lavatera arborea*. The larva is described, and it is pointed out that there are obvious discrepancies between the facts and the earlier brief descriptions of it. Possibly there may be two distinct species, the adults of which closely resemble each other. The larva lives in *L. arborea* and *Malva sylvestris*, infesting the flowers and seeds, the latter of which it eats. The larvae were found from mid-June until the second week in July. Adults emerged in August.

MALENOTTI (E.). **La difesa antiacridica in Provincia di Aquila nel 1921.** [Anti-Locust Work in the Province of Aquila in 1921.]—[*Italy*] *Minist. Agric.*, 24 pp. Verona, 1922.

The work done in 1920 [*R.A.E.*, A, x, 373] was continued in 1921 when the infestation covered a larger area. The swarms again consisted of *Calliptamus italicus*, chiefly of the form *marginellus*. In one locality *Dociostaurus maroccanus* was also present. The spread of this locust might result in serious damage because it is not checked by the fungus *Entomophthora grylli*.

In 1921 all stages of development were delayed 15–20 days, but vegetation progressed normally, with the result that the winged

individuals had less opportunity for damage owing to the advanced condition of the plants; in some localities potatoes had been lifted before the locusts appeared. Weather seems to influence migration; in one instance the swarms rose and flew some distance to avoid an impending heavy local storm. Further observations were made on the behaviour of the locusts towards some of the more important cultivated plants. In one instance the larvae attacked the tender shoots of grape-vine, while in a vineyard infested with weeds similar vines escaped owing to the superior attractiveness of the weeds, especially *Convolvulus arvensis*. The tender shoots of sugar-beet were so attractive that sometimes a poison-bran bait was neglected.

The beetle, *Mylabris variabilis*, which occurs in old foci of infestation, does not appear to follow *C. italicus* to new areas. Two large spiders, *Argiope bruennichii*, Scl., and *Agalena labyrinthica*, Cl., preyed on the winged individuals. In 1921 *C. italicus* was notably checked by the fungus, *Entomophthora grylli*, the epidemic being favoured by the cold and rainy weather in July. Contrary to existing statements the author did not observe *C. italicus* or *D. maroccanus* ovipositing before about 10 a.m., but only between that hour and the early afternoon. In view of the preference shown by locusts for arid lands it is remarkable that a site chosen for oviposition is not abandoned even if it becomes soaked with rain.

The measures adopted in 1920 were repeated, except that lead arsenate was not employed. Most of the work consisted in spraying the swarms with an aqueous solution of sodium arsenite, 1½–2 per cent.; or bran-baits poisoned with this solution or with 5 per cent. zinc phosphide were used. Bran poisoned with zinc phosphide loses its efficacy within a few days. It is therefore only suitable for work on a small scale. One pound of bran bait is sufficient to poison about 20 square yards. For future campaigns it is suggested that sodium arsenite only should be used and that each commune should receive a stock of this poison in good time and should have a supply of sprayers ready for immediate use.

Flint (W. P.). **The More Important Insecticides and Repellents.**—*Illinois Dept. Regis. & Educ. [Nat. Hist. Survey], Ent. Survey Div.* [Circ. 1], 6 pp. Springfield, Ill., 27th March 1918. [Received 4th December 1922.]

The preparation and use of the commoner insecticides are described under the headings of stomach poisons, contact poisons and fumigants, and a list is given of some of the manufacturers of these preparations.

Bequaert (J.). **The Predaceous Enemies of Ants.**—*Bull. Amer. Mus. Nat. Hist.*, xlv, pp. 271–331, 3 plates. New York, 19th October 1922.

The contents of this bulletin are extracted from *Ants of the American Congo Expedition*, by W. M. Wheeler, with the collaboration of J. Bequaert, I. W. Bailey, F. Santschi, and W. M. Mann, Parts i–ix.

The evidence presented, although fragmentary, rather tends to destroy the theory that ants are better defended than other insects against the attacks of predatory animals. They are shown to form a considerable portion of the diet of many reptiles, amphibians, birds and certain insect-eating mammals, some of these vertebrates being almost exclusively myrmecophagous.

HADLEY (C. H.). **The Japanese Beetle.**—*New Jersey Dept. Agric., Bur. Statist. & Inspec.*, Circ. 46, 20 pp., 1 plate, 10 figs. Trenton, N.J., February 1922.

This bulletin is a revision of information on *Popillia japonica*, Newm., that has previously been noticed [*R.A.E.*, A, viii, 307, 308, 374]. The present distribution of the beetle is given, and it is said to be spreading at the rate of about five miles a year. It is considered that the common lead arsenate spray, at the rate of 2–3 lb. powdered lead arsenate or 4–6 lb. paste in 50 U.S. gals. water, is the most practical method of preventing injury. This should be applied during the period when the beetles are about, the foliage being thoroughly and evenly coated.

FOLSOM (D.). **Potato Leafroll.**—*Maine Agric. Expt. Sta.*, Bull. 297, pp. 37–52, 10 figs. Orono, Maine, April 1921. [Received 4th December 1922.]

Tests have been made to determine the possibility of the transmission of leafroll by Aphids, the experiments described being on the same lines as those previously conducted with regard to mosaic disease. All the experiments proved that Aphids can transmit leafroll from one plant to another, but they can only do this after having sucked juice from plants affected with the disease. Transmission by Aphids is possible in the field as well as in the greenhouse, but the disease does not necessarily spread as rapidly in the field as mosaic does. Since Aphids are proved carriers of leafroll, some of the measures against the disease are suggested with a view to the Aphid factor, and in particular sprays of nicotine sulphate directed against the Aphids are advised, although definite recommendations cannot yet be given.

TAKAHASHI (R.). **Two New Genera of Aphidae (Homoptera).**—*Proc. Ent. Soc. Wash.*, xxiv, no. 7–8, pp. 204–206. Washington, D.C., October–November 1922.

Descriptions are given of *Neophorodon rubi*, gen. et sp. n., attacking the leaves and young shoots of *Rubus* sp. (? *fraxinifolius*) and of *Trichosiphonaphis*, gen. n., erected for *Myzus polygoniformosanus*, Takah., attacking the leaf and stem of *Polygonum perfoliatus* in Formosa. The characters differentiating the latter genus from *Myzus*, Pass., are discussed.

SIMMONDS (H. W.). **Insects affecting Cotton in Fiji.**—*Agric. Circ., Dept. Agric., Fiji*, iii, no. 3, pp. 36–38. Suva, July–September 1922.

In view of the attempt now being made to re-establish the cotton industry in Fiji, attention is called to the principal pests known to attack that crop. *Earias fabia* is a common pest in the drier regions, attacking cotton and *Hibiscus* spp. These alternative food-plants should all be destroyed in the vicinity of cotton plantations, and hand-picking of affected shoots should be practised where necessary *Platyedra* (*Gelechia*) *gossypiella*, Saund. (pink bollworm) was discovered in June 1922, and search proved it to occur at various points along the coast. It has probably been present for several years. A two months' close season for cotton is recommended. The cotton stainers, *Dysdercus insularis* and *D. impictiventris*, are likely to cause

considerable damage, though only the former is at present known to occur. They feed on common weeds of the genus *Sida* and on *Thespesia populnea*. The latter also harbours pink bollworms and the bug, *Tectocoris lineola*, which also attacks cotton, so that all these plants should be destroyed. Traps of heaps of cotton seed placed in shady spots and kept slightly damp are recommended for the stainers, which should be killed in the morning by boiling water. Other pests are cutworms, Aphids, mealybugs and Coccids.

SIMMONDS (H. W.). **Notes on the Coconut Leaf Moth.**—*Agric. Circ., Dept. Agric., Fiji*, iii, no. 3, p. 44. Suva, July-September 1922.

It has been noticed in the Island of Vitilevu that all the coconut trees along the wet portion of the country are brown and diseased as the result of infestation with *Levuana iridescens* (coconut leaf moth), while in the dry districts they produce a good crop. The reason probably is that in the dry districts the trees grow in isolated clumps, separated by wide areas of sugar-cane, without any other palms on which the moth can feed, so that when it dies out on a given patch the trees have time to recover before reinfestation takes place. *L. iridescens* was also observed feeding and ovipositing on banana in the vicinity of coconut palms.

FORSYTH (M. A.). **Reports on Scale in Gau.**—*Agric. Circ., Dept. Agric., Fiji*, iii, no. 3, pp. 45–46. Suva, July-September 1922.

Coconut and other trees were found to be badly damaged by Coccids [*Aspidiotus destructor*] at Taveuni. Where badly infested trees were cut and burnt and the surrounding plants sprayed with lime-sulphur solution, there was no reappearance of the scale, but as *Piper macgillivrayi* proved to be a favourite food-plant and was found to be infested all along the coast, it was found simplest to uproot this plant and throw it into the sea. The scale seems to work its way along the ground to fresh trees, as infestation invariably begins at the lower leaves, which would hardly be the case if the insects were wind-borne.

DE ONG (E. R.). **The Control of Red Spiders in Deciduous Orchards.**—*California Agric. Expt. Sta.*, Bull. 347, pp. 39–83, 12 figs. Berkeley, Cal., August 1922. [Received 4th December 1922.]

This bulletin gathers together and amplifies information that has largely been noticed in previous publications [*R.A.E.*, A, ix, 512; x, 511; xi, 11, etc.]

Proceedings of the Federal Horticultural Board Public Quarantine Conference, Sacramento, California, May 31st, 1922.—*Mthly. Bull. Cal. Dept. Agric.*, xi, no. 8–9, pp. 561–602. Sacramento, Cal., August–September 1922.

The Proceedings of this Conference consist of addresses by representatives of the various Western States, met together for the purpose of discussing the improvement and enforcement of plant quarantine regulations with the object of safeguarding the Californian fruit industry. The assistance of the Federal Horticultural Board in particular is desired, and the need for co-operation in these endeavours is urged. The chief menace to fruit-growing is the Mediterranean

fruit-fly [*Ceratitis capitata*, Wied.]. The quarantine measures that have been passed against this pest are reviewed, with much information on its present distribution and the damage caused by it, and the measures against it in Hawaii are outlined for comparison. It is suggested that one million dollars as a State grant, with the same amount from the Federal Government, would not be too much for the protection of California against this fly.

WICKS (W. H.). **Report of Idaho Conditions.**—*Mthly. Bull. Cal. Dept. Agric.*, xi, no. 8–9, pp. 614–624. Sacramento, Cal., August–September 1922.

The possibility is discussed of introducing lucerne meal into California from Idaho, the raw hay being prohibited on account of the alfalfa weevil [*Hypera variabilis*, Hbst.]. In spite of local quarantine measures within Idaho this pest is spreading slowly northwards, and is evidently permanently established. Tests have shown that the process of milling kills all live weevils, and this is suggested as sufficient reason for modifying the present quarantine against this product.

In the course of the subsequent discussion it was contended that there is danger of reinfestation of the meal after leaving the mills. On the other hand, there is much motor traffic between the two States, and it is suggested that the weevils might equally well be transported into California by this means on any other product. The representative of the State of Utah begged for uniformity of quarantine; at present each State having different quarantine rules, these always have to be looked up before any consignment can be exported. As, however, California is itself producing about one million acres of lucerne, the growers there are not inclined to modify their quarantines against Idaho, and the same may be said of Arizona, which also has a large lucerne production.

MOTE (D. C.). **Report of Arizona Conditions.**—*Mthly. Bull. Cal. Dept. Agric.*, xi, no. 8–9, pp. 625–628. Sacramento, Cal., August–September 1922.

The general lines of work for safeguarding the cotton crop in Arizona are outlined. The quarantine against boll weevil [*Anthonomus grandis*, Boh.] and pink bollworm [*Platyedra gossypiella*, Saund.] is enforced with great thoroughness, inspection being made of all packages entering by post, rail, or road. In a portion of Pima County a non-cotton zone was declared in November 1920, and was so successful that in 1921 a small patch of self-sown cotton and a plot allowed to grow for observation purposes were the only spots in which living weevils were found. The non-cotton zone was continued in 1922.

MOTE (D. C.). **A New Orange Pest in Arizona.**—*Mthly. Bull. Cal. Dept. Agric.*, xi, no. 8–9, pp. 628–633. Sacramento, Cal., August–September 1922.

It has long been known that a certain number of navel oranges drop each year in the Salt River Valley, Arizona, the fallen fruits showing infection with a black rot (*Alternaria citri*). It has recently been observed that many of these are also infested with small pink larvae that are probably those of a species of *Myelois*. Only Washington and Australian navel oranges seem to be affected; neither the

black rot nor these larvae were found in other oranges, lemons or grape-fruit. The work of the larvae rather resembles that of the codling moth, *Cydia (Carpocapsa) pomonella*, in apples. Eggs were laid in the laboratory upon the fruit, leaves and twigs, and what was apparently an egg has twice been observed in the field on the navel end of an orange. The period of incubation in the laboratory during late October was four days. Larvae matured during October and November in from 30 to 50 days. The larva is found in or near the bast fibre or core of the orange; sometimes a mass of frass at the navel end of the orange indicates the presence of the larva within. When nearly mature, the larva makes its way to the rind of the orange, and eats a circular hole almost through it. A cocoon is then constructed within, joined to the edges of this hole, in which pupation occurs. In the laboratory the pupal stage lasted from 8 to 13 days. In the field, larvae in all stages were collected from fallen fruit during July and August, and again during October and November, the latter apparently being of another generation. In early September and early December mature larvae predominated. Larvae were found in practically every orange grove visited, and in the majority of cases were observed only in fallen oranges that were also affected with *A. citri*. Occasionally, however, the larvae were found in oranges on the tree, and, very rarely, in oranges that showed no sign of black rot.

As the larvae are found within the orange for a period of from 30 to 60 days, the obvious remedy is the gathering and destruction of all fallen fruits. If, however, the insect is found to pass the winter in any other than the pupal stage, it will be necessary to destroy the last generation of larvae before the adults emerge.

The only previous record of *Myelois* sp. in Arizona is that of one individual of *M. venipars*, Dyar, caught at a trap light in October 1920. As a result of the investigations outlined above, the Arizona Commission of Agriculture has prohibited the movement of navel oranges from that State to California, and instructions have been issued to all Californian inspectors to that effect.

The relationship between *Myelois* sp. and black rot is not fully understood, and it is not known which is the primary cause of injury. If the insect is the primary cause, it will constitute a very serious pest.

LYNE (W. H.). **Report of British Columbia Conditions.**—*Mthly. Bull. Cal. Dept. Agric.*, xi, no. 8–9, pp. 638–641. Sacramento, Cal., August–September 1922.

All nursery stock imported into British Columbia is thoroughly inspected, and many pests have been intercepted. *Leptinotarsa decemlineata* (potato beetle), which about four years ago was not known to occur in British Columbia, was discovered just inside the British Columbia side of the Montana boundary, and is now about 30 miles north of that boundary. A persistent effort is to be made to exterminate it.

McLAINE (L. S.). **Insect Legislation in Canada.**—*Mthly. Bull. Cal. Dept. Agric.*, xi, no. 8–9, pp. 641–646. Sacramento, Cal., August–September 1922.

This paper has already been noticed from another source [*R.A.E.*, A, x, 612].

LIST (G. M.). **Report of Colorado Conditions.**—*Mthly. Bull. Cal. Dept. Agric.*, xi, no. 8–9, pp. 677–684. Sacramento, Cal., August–September 1922.

There is probably no other insect that has caused so much concern, during the last two years, in the south-eastern part of the United States, as the Mexican bean beetle [*Epilachna corrupta*, Muls.]. In Colorado this Coccinellid has one complete generation, while a certain percentage produces a second. In Louisiana it is said to pass through four generations. Observations in Colorado indicate that this species tends to migrate to the mountains for hibernation. If this is the case, when it takes flight in the spring, it will only travel a short distance from the foothills, and this would lessen the danger of infestation during the winter season at least. The best remedy used in Colorado is zinc arsenite.

MACKIE (D. B.). **Vacuum Fumigation.**—*Mthly. Bull. Cal. Dept. Agric.*, xi, no. 8–9, pp. 698–703. Sacramento, Cal., August–September 1922.

The successful use of the vacuum method of applying fumigants and insecticides for the protection of citrus and other trees from insect pests in California is described. A few of the more important pests, such as the peach borer [*Aegeria exitiosa*, Say], have been dealt with very successfully, miscible oil being forced into its burrows by this method.

MACKIE (D. B.). **Vacuum Fumigation of Citrus Nursery Stock in Ventura County.**—*Mthly. Bull. Cal. Dept. Agric.*, xi, no. 10, pp. 726–735, 5 figs. Sacramento, Cal., October 1922.

In consequence of the success obtained with vacuum fumigation, and of the desirability of supplementing inspection with treatment, it was decided to install a fumigation plant and make vacuum fumigation of all citrus stock imported into Ventura County a condition of entry. A schedule was agreed upon, by which not less than 1 oz. of sodium cyanide was to be used per 100 feet of space in the fumigation drum, with a period of one hour's exposure to the gas. The trees, previously defoliated, are loaded into the drum, the air is exhausted to a 27 in. mercurial vacuum, after which the gas (HCN) is injected. This is followed by air until normal atmospheric pressure, that is, zero on the vacuum gauge, is registered. After an hour's exposure to the gas the trees are removed. A table records the results of 48 consignments treated, and shows a certain amount of injury in the case of many trees. The possible effects of fumigation and of other factors that may have caused this injury are discussed. It is pointed out that any new method of pest control, when first put into commercial application, is sure to cause a certain amount of injury. It is not, however, considered that the strength of the dosage is at all responsible for injury, and it is not intended to make any change in the schedule.

FLEBUT (A. J.). U.S. Bur. Ent. **The Use of Nicotine Dusts in the Control of Citrus Thrips.**—*Mthly. Bull. Cal. Dept. Agric.*, xi, no. 10, pp. 745–754. Sacramento, Cal., October 1922.

Experiments were undertaken during the spring of 1922 to determine the effectiveness of nicotine in a dust carrier for controlling the citrus thrips [*Scirtothrips citri*, Moult.]. The high cost of thorough liquid spraying and the difficulties that would make dusting a much preferable process are explained. The tests described included dusting over

about 50 acres, in some parts as it would be done commercially, and in others using far more dust than would be profitable. In only one case were the results at all satisfactory, and then part of the benefit was obtained by the destruction of the crop of *Melilotus indica* on which the insects were breeding. The failure of the dusting method in the control of thrips seems to be partly due to difficulty of distribution, for in the slightest breeze thorough covering of the trees was impossible, and the cloud of dust was rapidly dispersed. The dust, moreover, did not kill the insects that were not in its direct path, but merely paralysed them for a time. Quite a weak dust would kill by direct covering, while stronger dusts, floating over the thrips, failed to do so. The instability of the dusts was another disadvantage, and the fact that their action was not lasting, though a few retained their odour longer than others.

The dusting method is not, however, entirely discredited for this purpose. It has advantages that make it worth while to seek some more efficient materials; a mixture composed largely of tobacco dust strengthened with nicotine sulphate seemed to be more efficient than the others, but as yet no definite recommendations can be made, as spraying undoubtedly showed itself to be the more efficient remedy. The amount and cost of the dust used in each experiment is tabulated; the average cost of dusting, for materials alone, is about £2 an acre.

MACKIE (D. B.). **Note on the Lesser Bulb or Lunate Fly** (*Eumerus strigatus*, **Fallen.**)—*Mthly. Bull. Cal. Dept. Agric.*, xi, no. 10, p. 759. Sacramento, Cal., October 1922.

Attention is called to the likelihood of a severe outbreak of *Eumerus strigatus*, Fall., in California. This Syrphid was first noticed in the State in 1915, and has been recorded attacking narcissus and hyacinth bulbs and onions. It has been reared from bulbs grown in Sacramento, there being two generations in a year. All bulbs imported should be carefully examined for the presence of the pest. Vacuum fumigation with carbon bisulphide at the rate of 2 lb. per 100 cu. ft. for a period of one hour clears the bulbs of infestation without injury, though a longer exposure generally results in damage.

MILBRATH (D. G.). **Résumé of Pear Blight History and Methods of Control.**—*Mthly. Bull. Cal. Dept. Agric.*, xi, no. 10, pp. 760-765. Sacramento, Cal., October 1922.

Pear blight was widespread and caused much damage in 1922, not only in California, but in practically every State where apples and pears are grown. The nature of the disease, caused by *Bacillus amylovorus*, is discussed. Dissemination is known to occur through the agency of bees, which carry the disease to the blossoms, and by *Lygus pratensis*, L. (tarnished plant bug) and *Aphis pomi*, DeG. (apple aphis), which chiefly infest the growing twigs. There are doubtless many other insects that travel up and down the trees at night and feed on the small globules of exudate, which are full of bacteria.

STRONG (L. A.). **Bureau of Plant Quarantine. A Synopsis of Work for the Months of March, April, May, June and July, 1922.** —*Mthly. Bull. Cal. Dept. Agric.*, xi, no. 10, pp. 775–780. Sacramento, Cal., October 1922.

The pests intercepted during March–July were: From the Canal Zone, *Lepidosaphes beckii* on oranges and grapefruit. From China,

Cylas formicarius in sweet potatoes; *Bruchus* (*Acanthoscelides*) *obtectus* in *Albizzia* seed; *Dermestes cadaverinus* in dried mushrooms; undetermined Cryptophagids in narcissus bulbs; and *Parlatoria pergandei*, *Chrysomphalus aonidum* and *Chionaspis citri* on oranges. From Cuba, *Aspidiotus* sp. on coconuts; and *Pseudococcus* sp. on pineapples. From England, *Cerataphis lataniae* and *Diaspis boisduvali* on orchids. From Egypt, *Phoenicococcus marlatti* on date palm shoots. From Guatemala, *L. beckii* on oranges. From Hawaii, *Pseudococcus citri*, *Saissetia nigra*, *L. auriculata*, *Parlatoria proteus*, *Coccus* sp., *C. mangiferae*, *C. elongatus*, and *Prenolepis* sp. on crotons; larvae of *Hyposmocoma*, *Ripersia palmarum*, *Hemichionaspis minor*, *H. aspidistrae*, *Chrysomphalus aonidum*, *Aspidiotus cyanophylli*, *A. lataniae*, *Phenacaspis inday*, *Ereunetis* sp., and *Prenolepis* sp. on coconuts; *S. nigra*, *Coccus mangiferae*, *C. elongatus*, *Pseudococcus* sp., *Pseudaonidia clavigera*, and *Howardia biclavis* on *Hibiscus*; *C. elongatus* on betel leaves; *H. aspidistrae* and *C. mangiferae* on ti plant; *Ceratitis capitata* in coffee berries and mangos; *Diaspis bromeliae* and *Pseudococcus bromeliae* on pineapples and bananas and *Aspidiotus bromeliae* on pineapples; *Dacus* (*Bactrocera*) *cucurbitae* in tomatos and cucumbers; *Coccus mangiferae* on *Daphne*; and *Pheidole megacephala*, *Orthezia insignis* and undetermined caterpillars on *Lantana*. From India, *Calandra* (*Sitophilus*) *oryzae*, *Bruchus chinensis* and *Attagenus* sp. in lentils; *Tribolium confusum* and *B. chinensis* in beans; *T. confusum* and *C. oryzae* in wheat; *Araecerus fasciculatus* in nutmegs; and *Pachymerus* (*Caryoborus*) *gonagra* in tamarind seed. From Japan, *Diaspis* (*Aulacaspis*) *pentagona* on deciduous trees and peach cuttings; *Monomorium pharaonis* on sugar-cane and raspberry cuttings; *Parlatoria pergandei*, *H. aspidistrae*, *Pseudaonidia trilobitiformis*, *L. beckii* and *L. gloveri* on citrus fruits; undetermined Lepidopterous larvae in cotton bolls; *Bruchus pisorum* in peas; and *Cydia* (*Laspeyresia*) *molesta* in pears. From Madagascar, undetermined Lepidopterous larvae and *Lophocateres pusillus* in lima beans. From Martinique, *Lepidosaphes beckii* on oranges. From Mexico, *L. beckii* and *Parlatoria pergandei* on citrus fruits; larvae of *Anastrepha ludens* in oranges and mangos; *Heliothis* (*Chloridea*) *obsoleta* in tomatos; *Bruchus quadrimaculatus* and *Tribolium ferrugineum* in garbanzas [*Cicer arietinum*]; *Anthonomus* sp. in guavas; *Pseudococcus* sp. on peppers, and *Agromyza* sp. in the skin of peppers; undetermined Sarcophagids in dried bananas; and *Chrysomphalus ficus* on coconuts. From Peru, *Phthorimaea operculella* in potatoes. From Siam, *Stephanoderes* sp. in bamboo. From Tahiti, *L. beckii* on lemons and oranges. From Tonga Islands, *Cathartus advena*, *Anisolabis annulipes*, *Pseudococcus citri*, *Hemichionaspis* sp. and *Euxestus parki* infesting yams. From Central America, *Aspidiotus cyanophylli*, *A. cydoniae*, *Pseudococcus maritimus*, *Chrysomphalus scutiformis*, *C. aonidum*, and *Selenaspidus articulatus* on bananas; *Solenopsis geminata* and *Cylindrocopturus* sp. in mahogany logs; and *Aphis* sp. and *Ripersiella* sp. on orchids. From Arizona, *Pseudococcus* sp. on egg-plant. From California, *L. beckii* on Florida-grown grapefruit. From Colorado, *L. beckii* and *P. pergandei* on Florida oranges and grapefruit. From Florida, *Chrysomphalus aonidum*, *L. beckii* and *Parlatoria pergandei*, on oranges and grapefruit; *C. dictyospermi* on stems of avocados; *Pseudococcus* sp. on pepper stems; and Drosophilids in mangos. From Georgia, *L. beckii* on oranges; and *Cydia* (*Laspeyresia*) *pomonella* on apples. From Indiana, *Dermestes vulpinus* in meat scraps; and *Myzus rosarum* on rose plants. From Maryland, *L. beckii* on pomelos. From Mississippi, *Dialeurodes citri* on Cape jasmin buds; and *Heliothis*

obsoleta in tomatos. From Missouri, *Pseudococcus citri* on *Buxus*; *Aegeria* (*Sanninoidea*) *exitiosa* in peach, plum and apricot trees; and *Heterodera radicicola* in peach roots. From Nevada, *H. radicicola* in potatoes; and *L. beckii* on Florida grapefruit. From Nebraska, *Myzus rosarum* on plants. From New Orleans, *Diabrotica duodecimpunctata*, *Lachnosterna* sp., *Periplaneta* sp. and *Prionus* sp. in banana cars. From New Hampshire, *Lepidosaphes ulmi* on lilac bushes; and *L. beckii* on oranges. From New Jersey, *Aspidiotus rosae* on rose plants. From New York, *L. beckii* on Florida-grown grapefruit; *Aegeria* (*Sesia*) *pyri* on apple tree; *Myzus rosarum* on roses; *Eucalymnatus tessellatus*, *Aspidiotus cyanophylli*, *Diaspis boisduvali* and *Hemichionaspis aspidistrae* on orchids; and *Eriosoma lanigerum* on pear stock. From Oregon *Trialeurodes* (*Aleurodes*) *vaporariorum* on honeysuckle; and *C.* (*L.*) *pomonella* and *Aspidiotus perniciosus* on apples. From Ohio, undetermined borers in raspberry plants; *Myzus rosarum* and *Tetranychus telarius* on roses; *C.* (*L.*) *pomonella* in apples; *Pseudococcus* sp. on *Coleus*; and *A. perniciosus* on mulberry. From Pennsylvania, *Myzus rosarum* on roses. From Texas, weevils in sacks of peppers and chillies; *L. beckii* and *C. aonidum* on sour limes; and *Dialeurodes citri* and *Ceroplastes floridensis* on Cape jasmin. From Utah, *L. beckii* on Florida-grown grapefruit. From Washington, *Heterodera radicicola* in potatoes; *C.* (*L.*) *pomonella* in apples; and *Parlatoria pergandei* and *L. beckii* on Florida grapefruit. From Wisconsin, *C.* (*L.*) *pomonella* in apples.

SEVERIN (H. C.). **The Pear, Cherry or Plum Slug.**—*S. Dakota State Ent.*, Circ. 27, 6 pp., 2 figs. Brookings, S.D., 1st May 1918. [Received 4th December 1922.]

Eriocampoides limacina, Retz. (*Caliroa cerasi*, L.) is known chiefly as a pest of plum trees in South Dakota. The sawflies appear early in June, and deposit eggs under the upper epidermis of the leaves. Only females have been known so far in South Dakota, and they are apparently parthenogenetic. In cool weather the eggs hatch in 2–3 weeks, and in warmer weather in a week. After 13–28 days the larvae burrow in the soil, some pupating in a week or two, the remainder hibernating till the following spring. The adults from the former emerge in 14 days and deposit eggs. The larvae of the first brood are present during the middle of June and July, while those of the second brood are found from the end of July to early in September. Defoliation weakens the tree and the fruit, and the trees may fail to produce buds for the next year. If they are defoliated by the first brood larvae and a second crop of leaves is produced, these may also be destroyed by the second brood larvae.

If the fruit on the trees is still green or has already been picked, infested trees should be sprayed with 1 lb. powdered lead arsenate to 50 U.S. gals. water, adding 1 lb. of soap to make it adhere and spread well. If the fruit is beginning to ripen, dusting with 1 lb. hellebore diluted with 5 lb. air-slaked lime, or spraying with 1 oz. hellebore and 1 oz. soap to 3 U.S. gals. water is recommended. The larvae may be destroyed by spraying with 1 U.S. pt. Black-leaf 40, 1½ lb. soap and 50 U.S. gals. water, or 3 teaspoonfuls Black-leaf 40, 1 oz. soap and 3 U.S. gals. water. Plain soap solutions, if applied warm, kill the larvae that are actually struck by the spray. They may be prepared by dissolving 1 lb. whale oil soap, or 1 10-ounce bar of laundry soap, in 2 U.S. gals. water.

SEVERIN (H. C.). **The Chinch Bug.**—*S. Dakota State Ent.*, Circ. 28, 14 pp., 2 figs. Brookings, S.D., March 1922.

A description is given of all stages of *Blissus leucopterus*, Say (chinch bug) together with notes on its bionomics and the injury it causes. In South Dakota most of the eggs are laid during the latter part of May and the first half of June; and usually hatch in 10–21 days. The bugs are most harmful to wheat, barley, rye, oats and maize, and the principal injury is caused after migration from fields of small grain. The various remedial measures recommended for this pest have already been noticed from other sources.

SEVERIN (H. C.). **The Striped Cottonwood Leaf Beetle.**—*S. Dakota State Ent.*, Circ. 29, 6 pp., 2 figs. Brookings, S.D., March 1922.

Melasoma (*Lina*) *scripta*, F. (striped cottonwood leaf beetle) and *M.* (*L.*) *interrupta*, F. (spotted willow leaf beetle) are the chief pests of these trees in South Dakota, and can cause severe injury in the spring. Their life-cycle and habits are similar. The adults hibernate under fallen leaves, stones, etc. The females lay their eggs in clusters on the lower surface of the expanded leaves. In warm weather the eggs hatch in less than a week. The larvae feed on the leaves, and when mature, make their way to the lower branches or to the trunk about two feet above the soil, and pupate on the bark. The pupal stage lasts 7–10 days. At least three generations a year occur in South Dakota, and under favourable conditions, four. A description is given of all stages.

The most effective remedial measure is spraying both sides of the leaves with lead arsenate, giving the first application in the spring when the beetles are first noticed on the trees, and repeating whenever necessary. For large quantities of spray the following formula should be used: 1 lb. powdered lead arsenate, 3 lb. laundry soap, and 50 U.S. gals. water, and for small quantities, two heaped tablespoonfuls of powdered lead arsenate, 3 oz. laundry soap, and 3 U.S. gals. water. When the trees are small and the beetles congregate in the spring on the new growth, they may be jarred into a pan containing water and kerosene.

SEVERIN (H. C.). **Quarantine Orders issued by State Entomologist of South Dakota, to be effective on and after May 15, 1922, until otherwise ordered.**—*S. Dakota State Ent.*, Circ. 31, 9 pp. Brookings, S.D., 25th April 1922.

Of these quarantine notices, Nos. 2–5 prohibit the entry into the State of certain plants and trees from various other States that are infested with the following pests, which are not at present known in South Dakota: *Pyrausta nubilalis*, Hb. (European corn borer), *Stilpnotia salicis*, L. (satin moth), *Popillia japonica*, Newm. (Japanese beetle), *Porthetria dispar*, L. (gipsy moth) and *Nygmia phaeorrhoea*, Don. (*Euproctis chrysorrhoea*, L.) (browntail moth).

HUTSON (J. C.). **The Red Weevil or Palm Weevil** (*Rhynchophorus ferrugineus*).—*Trop. Agric.*, lix, no. 4, pp. 249–254, 1 plate Peradeniya, October 1922.

A general account is given of the life-history and habits of *Rhynchophorus ferrugineus*, which is the most serious pest of coconuts in Ceylon, as it breeds in the living palms, which are either killed or seriously

injured. The adults do little feeding and live for two or three months. They are less active after dark. They are attracted to diseased and injured palms and have been known to detect favourable breeding-places at a distance of 1,000 yards [*R.A.E.*, A, ix, 298]. The eggs are laid in any soft spot or at the base of the palms, where the bark has cracked. Experimentally the maximum number laid by one female was 231, others laying 50–200. The larvae cause the most damage by eating out a cavity in the crown or trunk. They mature in 2 or 3 weeks and pupate wherever they are feeding, this stage lasting two weeks. The complete life-cycle occupies 4–5 months, but may be shorter under natural conditions and in coastal districts.

Annuaire international de Législation agricole, xième Année, 1921.—lxi + 1330 pp. Rome, Inst. internat. Agric., 1922. Price Fr. 30.

The legislation relating to agriculture passed during 1921 is reviewed and discussed. Part vii of the volume, covering 24 pages, deals with the legislation regarding diseases of plants and vegetable and animal pests noxious to agriculture.

Importation en Algérie des végétaux, fruits, légumes, fleurs et tous produits utilisables en culture et exportation d'Algérie des végétaux vivants, oignons à fleurs et fleurs coupées.—*Rev. hortic. Algérie*, xxvi, no. 8, pp. 136–140. Algiers, October 1922.

The importation into Algeria of plants (including vines) is regulated by a decree dated 14th February 1922, in accordance with the findings of the International Conference of Phytopathology held at Rome in 1914. All plants, or any parts of plants, vegetable manures, etc., may only enter by the ports of Oran, Algiers, Philippeville or Bône, where there are disinfection stations. If originating from a country that does not adhere to the resolutions of the Conference, consignments must be accompanied by a certificate declaring their freedom from certain pests and diseases enumerated, which are considered a menace to Algerian cultivation. If from countries that have adopted the resolutions of the Conference, no certificate is necessary, but consignments must be accompanied by an invoice or declaration from the consignor giving certain particulars with regard to the goods. The localities protected under quarantine with regard to *Phylloxera* are enumerated, and the regulations governing the introduction of fresh fruit and vegetables for food purposes are quoted. Plants for export must be accompanied by a certificate issued by the Phytopathological Inspection Service.

Felt (E. P.). **A New Cecidomyiid Parasite of the White Fly.**—*Proc. U.S. Nat. Mus.*, lxi, Art. 23, no. 2444, pp. 1–2. Washington, D.C., 1922.

Cleodiplosis aleyrodici, gen. et sp. n., is described as a parasite of the whitefly, *Aleurycus chagentios*, from which it has been reared in considerable numbers. The material was received from Panama City.

Gowdey (C. C.). **Prevention and Control of Insect Pests.**—*Jamaica Dept. Agric.*, Ent. Circ. 5, 7 pp. Kingston, 1921. [Received 7th December 1922.]

The contents of this paper have already been noticed from another source [*R.A.E.*, A, x, 468].

GOWDEY (C. C.). **Control Measures against the Citrus Black Fly.**—*Jamaica Dept. Agric.*, Ent. Circ. 6, 3 pp. Kingston, 1922.

The measures recommended against the citrus blackfly [*Aleurocanthus woglumi*] are cultural ones. An area of about 9 ft. from the trunk of the tree should be cleaned, loosened, fertilised, and, if desired, a crop, preferably a leguminous one, could be grown on it. The tree should be pruned, and dead and dying twigs removed. The insecticides that have given the best results are 1 lb. whale oil soap and 2-4 gals. water, or 1 gal. kerosene, 10 oz. hard soap and 1 gal. water. The soap, in fine shavings, should be dissolved in hot water and the kerosene added, the whole being stirred till a white, creamy mixture is formed. One of the best means of doing this is to run the solution through a spray pump, driving it back into the vessel from which the solution is drawn and after 5 or 10 minutes of this mixing a perfect emulsion will result. The stock solution should be diluted with 18 parts water before application. Spraying should be done in the dry season. Contact sprays must touch the insects, and better results are obtained with a fine spray. Heavy rains and prolonged drought also assist in checking the development of this Aleurodid.

The Problem of Insects injurious to Alfalfa.—*Nevada Agric. Expt. Sta. Ann. Rept. Year ending 30th June 1921*, pp. 16-20. Reno, Nevada, 1922.

Studies undertaken in Nevada during 1921 on the alfalfa weevil [*Hypera variabilis*] show that it is thinly scattered over a large area without being destructively abundant anywhere, indicating a slow rate of increase and control by natural conditions. It is probable, however, that within a few years the weevil will become abundant enough to injure the first crop and seriously set back the second. Spraying will then be necessary, and preparations are being made for this. Quarantine measures in other States have not proved successful in preventing the weevil from gaining access. Some parasites have been introduced from the Salt Lake Valley where they have been effective [*R.A.E.*, A, viii, 12], and it is hoped they will become established.

WHITNEY (L. A.). **Report of Chief Plant Inspector, August 1922.**—*Hawaiian Forester & Agriculturist*, xix, no. 10, pp. 234-235. Honolulu, October 1922.

The pests intercepted in August 1922 included: from Japan, *Bruchus pisorum* in beans, and from the United States, *Pseudococcus citri* on *Coleus*, and *Pheidole* sp. in vegetables.

Spring-tails attacking Mangolds.—*Jl. Minist. Agric.*, xxix, no. 9, pp. 828-829. London, December 1922.

Investigations in a field of mangels showed large numbers of *Smynthurus* (*Bourletiella*) *hortensis*, Fitch, on the plants and surrounding soil, many feeding on the roots and causing conspicuous bleeding. The roots of seedlings appeared to be constricted at the soil level, just below the crown, the crown itself and the remaining root below ground being of more or less normal development. This constriction frequently increases in intensity until in the process of thinning or during high winds the top portion of the plant becomes separated

from the lower. It is extremely probable that these Collembola are the first and only cause of the thread-like condition of the young mangel plants above the ground, but this has not been definitely proved. This species has previously been reported as injuring various crops, including mangels, both in England and abroad, but does not appear to have been associated with the injury described above. As the insects never feed below the ground, earthing up the plants so that no roots are exposed may prevent attacks. Varieties of mangels are susceptible according to the amount of exposed root above ground in the early stages of growth, which appeared on the fields examined to be a characteristic of yellow rather than red mangels. A similar type of damage to roots below ground is caused by the beetle, *Atomaria linearis.*

WOLCOTT (G. N.). **Los gusanos de la hoja del tabaco.** [Tobacco Leaf Caterpillars.]—*Porto Rico Insular Expt. Sta., Rio Piedras,* Circ. 53, 15 pp., 8 figs., 1 plate. San Juan, P.R., 1922.

The Lepidopterous larvae that attack tobacco foliage in Porto Rico include: *Protoparce* (*Phlegethontius*) *sexta jamaicensis,* Butl., which has tomato as an alternative food-plant and is checked by an egg-parasite, *Telenomus monilicornis*; *Pachyzancla periusalis,* Wlk., also feeding on nightshade and wild egg-plant and parasitised in the egg, larval and pupal stages by a fly, *Argyrophylax albincisa,* Wied.; and *Phthorimaea operculella,* Z., which is more common and injurious than *Pachyzancla periusalis,* its steady increase in Porto Rico being probably due to the absence of a natural enemy. The most abundant cutworm is *Feltia annexa,* Treits., others being *Xylomyges sunia,* Gn., and *Prodenia ornithogalli,* Gn. These are also very harmful to vegetables, especially tomato. *Phytometra* (*Plusia*) *rogationis,* Gn., chiefly attacks tomato, but sometimes occurs on tobacco. With the exception of *Phthorimaea operculella,* for which no cheap and efficacious remedy has been found, all these pests may be destroyed by dusting with Paris green or lead arsenate.

WOLCOTT (G. N.). **Áfidos de importancia economica en Puerto Rico.** [Aphids of Economic Importance in Porto Rico].—*Porto Rico Insular Expt. Sta., Rio Piedras,* Circ. 59, 11 pp., 9 figs. San Juan, P.R., 1922.

Aphis nerii, Boy., infests *Calotropis procera* (silk cotton), *Asclepias curassavica* and *A. nivea. Sipha flava,* Forbes, and *Aphis setariae,* Thos., are found on sugar-cane, and *A. gossypii,* Glover, on cotton and melon. *Rhopalosiphum persicae,* Sulz., attacks pimentos and egg-plants, and *Aphis maidis,* Fitch, maize. *Toxoptera aurantiae,* Boy., is an important species attacking mammee [*Mammea americana*], *Citrus,* coffee and cacao. *Macrosiphum illinoisensis,* Schimer, lives on the shoots of *Cissus ampelopsis. Cerataphis* sp. infests ornamental palms and orchids. Aphids are not, however, a serious pest in Porto Rico because of the control exercised by natural enemies, especially Coccinellid beetles. Of these, *Cycloneda sanguinea,* L., and *Megilla innotata,* Muls., are the better known species, though they are not so abundant as *Hyperaspis apicalis,* Muls., *Scymnus loewi,* Muls., and *S. roseicollis,* Muls. *Chrysopa collaris,* Schm., and Syrphid flies including *Baccha clavata,* Wied., also destroy large numbers.

WOLCOTT (G. N.). **Vaquitas de importancia economica en Puerto Rico.** [Weevils of Economic Importance in Porto Rico.]—*Porto Rico Insular Expt. Sta., Rio Piedras,* Circ. 60, 20 pp., 20 figs. San Juan, P. R., 1922.

In Porto Rico the term "vaquita" is also used for Pentatomid bugs, but this circular deals exclusively with the weevils.

The guava leaf-roller, *Attelabus sexmaculatus*, Chev., is very common; its eggs are parasitised by *Poropoea attelaborum*, Gir. The sweet potato weevil, *Cylas formicarius*, F., prevents large scale cultivation of sweet potatoes in some districts, but it may be combated by using clean seed and by avoiding planting in ground infested during the previous year. The scarabee [*Euscepes batatae*], which is less common than *C. formicarius*, may be controlled in the same way. *Baris torquatus*, Boh., and *Anthonomus pulicarius*, Boh., attack egg-plants. *Chalcodermus ebeninus*, Boh., oviposits in the seeds of the cowpea, the larvae developing within them and then dropping to the ground to pupate.

Metamasius hemipterus, L. (cane weevil) is a serious pest in some places. *Cosmopolites sordidus*, Germ., attacks yams and the rhizomes of Guinea grass.

Diaprepes abbreviatus, L., and its varieties feed on the foliage of sugar-cane, sweet orange, coffee, aguacate, mango, beans, etc. The leaves of the West Indian cocoa plum [*Chrysobalanus*] are so attractive that it would be difficult in Porto Rico to find specimens of this plant free from traces of injury. In cane-fields where white grubs (*Lachnosterna*) are collected, 25–50 per cent of the larvae taken are those of *Diaprepes*. There is no remedy for an existing infestation, but the next crop may be saved—at least partly—by killing the larvae when harvesting and ploughing. Castor-oil plants grown near cane will attract many weevils.

The coffee weevil, *Lachnopus coffeae*, Mshl., and its variety *montanus*, Mshl., feed on the young leaves, the buds and even the young seeds of coffee. They are seldom numerous enough to destroy all the shoots. Though found at all seasons, they are more abundant from April to June. Captive adults have lived up to three months. The eggs are usually found in summer and early autumn between two leaves stuck together with a viscous substance, and are parasitised by a species of *Tetrastichus*. The eggs hatch in 12–14 days and the larvae drop to the ground and feed on small roots; even when very abundant, they seem to do no harm to coffee roots. As repeated spraying with lead arsenate is a costly measure, collection is advised, and many larvae and pupae can be destroyed by hoeing in spring.

The leaves of sweet orange and grape-fruit are attacked by *Exophthalmodes roseipes*, Chev., which in one district has been found sheltering in the bracts of cotton bolls. This species is common on the north coast, especially in sandy ground near the shore. Most of the injury to grape-fruit and sweet orange is really due to the nocturnal feeding of *Lachnosterna citri*, Smyth, but is ascribed to the weevil, which is seen by day. *Lachnopus curvipes*, F., resembles the coffee weevil but does not feed on coffee; it infests a number of wild plants and is the species most frequently found hidden in the bracts of cotton bolls. It feeds on the leaves of cotton and grape-fruit, but not sufficiently to do much harm. It only occurs in summer and autumn and probably has one annual generation. *Exophthalmodes capsicalis*, Mshl., attacking strawberries, and another species found on coffee in the interior, are rare.

WOLCOTT (G. N.). **Insectos que atacan los productos almacenados.** [Pests of Stored Products.]—*Porto Rico Insular Expt. Sta., Rio Piedras*, Circ. 65, 8 pp. San Juan, P. R., 1922.

Several beetles are warehouse pests in Porto Rico. *Spermophagus pectoralis*, Say, *Bruchus pisorum*, L., *B. obtectus*, Say, *B. chinensis*, L., and *B. quadrimaculatus*, F., are all able, with the exception of the last-named, to breed in dry seeds. They have not been found breeding in native Leguminosae. *Tribolium ferrugineum*, F., *Silvanus surinamensis*, L., and *Laemophloeus minutus*, Oliv., oviposit on the foodstuffs they infest, and development is so accelerated in the climate of Porto Rico that only a month is required to complete the life-cycle. None of these beetles is so common and destructive as *Calandra oryzae*, L., which multiplies so rapidly in stored maize that in a few months it becomes only fit for poultry food. Sugar of inferior grade is sometimes infested by the larvae of *Nausibius clavicornis*, Kug. These may be removed by means of a sieve.

The Angoumois grain moth, *Sitotroga cerealella*, Oliv., is also a very serious pest of maize, and other Lepidoptera infest dried fruit and similar products.

WOLCOTT (G. N.). **Insect Parasite Introduction in Porto Rico.**—*Jl. Dept. Agric. Porto Rico*, vi, no. 1, pp. 5-20, 7 figs. San Juan, P. R., January 1922.

Owing to the scarcity of important native enemies of *Lachnosterna* (white grubs) in Porto Rico, attempts have been made to import them from other countries. In the Northern United States the most important parasite is *Tiphia inornata*, Say, which itself is parasitised by *Exoprosopa fasciata*, Macq., and *Anthrax fulvohirta*, Wied., in addition to the hyperparasites already recorded [*R.A.E.*, A, iii, 87]. In spite of careful methods of collection and shipment, the introduction failed, as not a single parasite completed its development in captivity. One factor contributing to the failure was the difficulty in determining the species of *Tiphia* being introduced. It was first thought that all were species of *T. inornata*, but at least four species occur in Central Illinois. The cocoons of *T. illinoisensis*, Roh., are small, but those of the commonest species collected, *T. vulgaris*, Roh., are indistinguishable from those of the less common *T. clypeata*, Roh., and *T. tarda*, Say. Nor is it possible in practice to distinguish the species when the adults emerge, as the specific characters, even of dead specimens, are not readily observable. *Elis collaris*, Say, was also introduced from Illinois, but few adults emerged in Porto Rico.

In the summer of 1921 several small black wasps were found feeding on the secretions of a scale, *Pulvinaria psidii*, Mask., which are considered by Mr. Rohwer to be a new species of *Tiphia*. Whether they really represent a native species not previously collected, or whether they are descendants of an introduced species and are parasitic on *Lachnosterna*, has yet to be determined.

In 1913 *T. parallela*, Smith, was imported from Barbados, but no special arrangements were made to breed it on *L.* (*Phytalus*) *insularis*, Smyth, the species of white grub in Porto Rico most nearly related to *L. smithi*, and the females did not oviposit on the larger *Lachnosterna* larvae.

Scoliids already present in Porto Rico and native to the Island are *Campsomeris dorsata*, F., a parasite of *Ligyrus tumulosus*, Burm., which feeds on decaying vegetation in the soil and never on living

cane roots, and *Elis haemorrhoidalis*, F., a parasite of *Lachnosterna insularis*, which is found in abundance in sandy soil near the beach. Cocoons of this Scoliid, with the mandibles of a third-instar larva of *L. insularis* entangled in its outer threads, have been found in a field where no undestroyed larvae of this species were present, though larvae of *L. citri* were present in abundance and unparasitised. Less common Scoliids, of which the life-history and host are unknown, are *E. ephippium*, F., *Campsomeris atrata*, F., *C. pyrura*, Roh., and *C. trisfasciata*, F.

Other parasites include an undetermined Tachinid collected in Illinois, but no adults emerged in Porto Rico. There are already present in Porto Rico two Tachinids, *Cryptomeigenia aurifacies*, Walt., and *Eutrixoides jonesi*, Walt., which are parasitic on native *Lachnosterna*. They are not found on the dry sections of the south side, where white grubs cause the greatest damage, and attempts to introduce them artificially have been unsuccessful. The Asilid, *Promachus vertebratus*, Say, was introduced from Illinois, but not liberated, as it kills honey bees. Seven species of Asilids are reported to occur in Porto Rico, *Proctacanthus rufiventris*, Macq., being quite common. An Ortalid, *Pyrgota undata*, Wied., was also introduced from Illinois, where the females oviposit on the beetles as they fly at night, but no adults emerged.

Pseudococcus calceolariae, Mask., and *P. sacchari*, Ckll., are nearly always present on sugar-cane; their natural enemies in Barbados and British Guiana have already been noticed [*R.A.E.*, A, ii, 31; v, 503]. These might be advantageously introduced if the delays of transportation could be overcome. *Cryptolaemus montrouzieri*, Muls., the larvae of which feed on mealy-bugs, was introduced from California and is now established. This Coccinellid only feeds on mealy-bugs and scales on plants and trees; those on sugar-cane are protected from it, as they live on the leaf sheaths round the cane stalks. Unsuccessful attempts were made to introduce a Coccinellid from Trinidad.

WOLCOTT (G. N.). **The Influence of the Variety of Sugar-cane on its Infestation by *Diatraea saccharalis*, and the other Factors affecting the Abundance of the Moth Borer.**—*Jl. Dept. Agric. Porto Rico*, vi, no. 1, pp. 21–31, 1 table, 2 figs. San Juan, P. R., January 1922.

Diatraea saccharalis, F., is abundant in sugar-cane in all parts of Porto Rico, though the white grubs, *Lachnosterna vandinei*, Smyth, *L. portoricensis*, Smyth, *Strataegus titanus*, F., and the root borer, *Diaprepes abbreviatus*, L. (*spengleri*, L.), cause more severe injury in restricted localities.

This paper points out the effect of methods of sugar-cane cultivation practised in Porto Rico, the varieties grown and the rainfall on the habits and abundance of *D. saccharalis*, with a brief account of its bionomics. The observations made in 1915 and 1916 on the effect of rainfall and the burning of trash have already been noticed [*R.A.E.*, A, iii, 760]. The burning of trash is not recommended, as this also destroys the egg-parasites, *Trichogramma minutum*, Riley, and *Prophanurus alecto*, Crawf. The average infestation of several varieties of sugar-cane is given.

As the moths cannot emerge from the pupa if the cane is buried in the soil, the planting of all seed containing borer larvae or showing their injury is recommended; this does not cause the young shoots

to be infested. Any discarded seed should be buried, as burning is not effective. To prevent adults flying in from adjacent fields when the cane is being cut, harvesting should be begun to the windward, or in fields farthest away from the mill, and all cane should be cut in regular sequence until the other end is reached. No fresh cane should be planted until all the surrounding fields are harvested. All cane, even the poorest stalks, should be sent to the mill as the only sure way of destroying insects. Another source of infestation is cut cane deposited at loading stations, etc. When mills are located outside cane-growing districts, moths emerging from stored cane perish before they can reach the nearest cane field. If *Trichogramma minutum* is abundant, it will destroy the egg-clusters resulting from moths reaching fields from sources of infestation that cannot be eliminated, and this further emphasises the importance of not burning trash.

WOLCOTT (G. N.). **The Insects of Sugar Cane in Santo Domingo.**—*Jl. Dept. Agric. Porto Rico*, vi, no. 1, pp. 32–37, 1 plate. San Juan, P. R., January 1922.

The insect pests of sugar-cane in Santo Domingo include: *Kolla (Tettigonia) similis*, Wlk. (West Indian sugar-cane leafhopper); *Stenocranus (Saccharosydne) saccharivorus*, Westw. (West Indian cane-fly), which is heavily parasitised, especially in the egg-stage; *Sipha flava*, Forbes (yellow sugar-cane aphis), probably preyed upon by the Coccinellids, *Cycloneda sanguinea*, L., and *Hyperaspis apicalis*, Weise; *Pseudococcus boninensis*, Kuwana; *Prenes ares*, Feld., parasitised by *Apanteles disputabilis*, Ashm.; *P. nero*, F.; *Catia misera*, Lucas; *Perichares corydon*, F.; *Calisto pulchella*, Lathy (Santo Domingo cane butterfly), parasitised by *Chalcis annulata*, F.; *Diaprepes quadrivittatus*, Ol. (Santo Domingo weevil root borer); *D. abbreviatus doublieri*, Guér. (*spengleri comma*, Boh.); and *Metamasius sericeus*, Ol. (weevil stalk-borer of sugar-cane). A short bibliography is appended.

JONES (T. H.) & WOLCOTT (G. N.). **The Caterpillars which eat the Leaves of Sugar Cane in Porto Rico.**—*Jl. Dept. Agric. Porto Rico*, vi, no. 1, pp. 38–50, 10 figs. San Juan, P. R., January 1922.

Among the Lepidopterous larvae known to feed on the leaves of sugar-cane in Porto Rico are *Prenes nero*, F., which is common during the autumn and winter months. The eggs are laid singly on the leaves and hatch in 4–5 days, and the larvae eat entirely through the leaf blade. In captivity pupation occurred after 30 days, and lasted 10–12 days. The larvae also feed on rice, bamboo, malojillo grass [*Panicum barbinode*] and Johnson grass [*Sorghum halepense*]. The larvae are parasitised by *Ardalus antillarum*, Gah., and *Apanteles prenidis*, Mues., and the eggs by *Trichogramma minutum*, Riley; *Polistes crinitus*, Felton, has been observed to suck the juices of a pupa. These enemies are so effective that artificial measures need not be considered. *Prenes ares*, Feld., is less abundant, and is also found on coarse grasses. The eggs are laid singly and hatch in 3–4 days, and the larvae feed at night on the leaves. The adults emerge 9–10 days after pupation. The eggs are parasitised by *T. minutum* and the larvae by the Ichneumonids, *Apanteles prenidis* and *Microbracon* sp. The larvae of another skipper, *Atrytone vitellius*, F., feed on older cane leaves at night, and *Perichares corydon*, F., has also been known to feed on cane occasionally.

Cirphis (*Heliophila*) *latiuscula*, H.S., is the least important of the Noctuids that feed on cane, as the larvae feed only on the large and mature cane and usually occur singly. The eggs have not been found in Porto Rico. The pupal period occupies 2–3 weeks. The eggs are parasitised by *T. minutum*, the larvae by *Apanteles marginiventris*, Cress., *Euplectrus* sp. (the larvae of which feed on the outside of the caterpillar until they are ready to pupate, when they crawl beneath the empty skin and spin their cocoons), and the Tachinid, *Compsilura oppugnator*, Walt. *Laphygma frugiperda*, S. & A., is a well-known pest in the United States, and its bionomics and natural enemies have already been noticed [*R.A.E.*, A, ii, 49; iii, 134]. Other parasites are *A. marginiventris*, *T. minutum* and *Euplectrus comstocki*, How. When the young larvae are numerous, an application of powdered lead arsenate will kill them before they do any damage. All cane-fields and low-lying land should be kept as free from grass as possible. *Remigia* (*Mocis*) *punctularis*, Hb. (*repanda*, auct.) has a wide distribution in America, but has only been recorded as a pest of sugar-cane from Trinidad and Demerara. The eggs have not been observed in Porto Rico. The Tachinids, *Phorocera claripennis*, Macq., *Linnaemyia fulvicauda*, Walt., and *Helicobia helicis*, Towns., are the most important parasites. *Chalcis* sp., near *robusta*, Cress., and an Ichneumonid, a new species of *Rhogas*, have been bred from large larvae or from the pupae. The Sarcophagid, *Sarcophaga sternodontis*, Towns., has been bred from the larvae and also from those of *L. frugiperda*, and even from *Lachnosterna vandinei*, Smyth, and *L. portoricensis*, Smyth. Unless the larvae of this moth are observed when they are still small and poison applied before they have done any injury, it is not desirable to attempt to poison them, as the parasites will usually prevent another outbreak in the same or neighbouring fields during the same season.

All the larvae that feed on sugar-cane in Porto Rico are pests of minor importance, largely owing to their control by parasites, but those of *L. frugiperda* and *R. punctularis* have sometimes, especially in low-lying places, completely defoliated considerable areas.

Quarantine Proclamation No. 100.—*Commonwealth of Australia Gazette.* Melbourne, 23rd November 1922.

This proclamation, dated 20th November 1922, is a renewal of Quarantine Proclamation No. 87 of the 8th December 1921 [*R.A.E.*, A, x, 130].

Jarvis (H.). **Fruit Fly Investigations.**—*Queensland Agric. Jl.*, xviii, pt. 4, pp. 269–271. Brisbane, October 1922.

In further investigations [*R.A.E.*, A, x, 562] on the fruit-fly, *Dacus ferrugineus* (*Bactrocera tryoni*) no living pupae were found in the soil under orchard trees, though a few were found wintering in stored apples and between flooring boards. An experiment is recorded which seems to indicate that the burying of maggot-infested fruit in fresh lime may prove effective in destroying the larvae. This fly has also been intercepted in oranges and other fruits from New South Wales together with *Chrysomphalus* (*Aspidiotus*) *aurantii* (red scale), *C. aonidum* (*A. ficus*) (circular black scale) and *Lepidosaphes* (*Mytilaspis*) *gloveri*.

Other pests are *Aspidiotus perniciosus* (San José scale); *Xyleborus solidus*, Eichh.?, which infests unhealthy plum and apricot trees;

Maroga unipunctana, Don. (cherry wood borer), found in a three-year-old tree; *Doticus pestilens*, Ollf. (dried-apple beetle), infesting dried apples and peaches, in which it deposits eggs late in the autumn; and *Doratifera vulnerans*, Lewin (cup moth), on plum. The larvae of this Limacodid devour the surface tissue of the leaves, and this is thought to be the first record of it on plum trees, though it is known to attack apricots and is usually found on various species of *Eucalyptus*. Grasshopper eggs (*Caedicia* sp.) were found in rows on young shoots of peach and apricot. They hatch in the spring, and the resulting grasshoppers devour the leaves and gnaw the young fruit. Shoots harbouring eggs should be destroyed. A small Hymenopteron is parasitic on the eggs.

FROGGATT (J. L.). **The Banana Beetle Borer. III.**—*Queensland Agric. Jl.*, xviii, pt. 4, pp. 279–288, 3 plates, 4 tables. Brisbane, October 1922.

Further observations on the banana beetle borer [*Cosmopolites sordidus*] were carried out from January to July 1922 [*R.A.E.*, A, x, 232]. The most generally favoured site for the deposition of the egg in standing plants is just above ground level, the egg lying just underneath the surface. In stems and corms lying on the ground the eggs are usually laid on the underside. Oviposition is active up to early June, being highest in March and April, and decreasing in May. Extremes of heat and cold decrease egg development. Oviposition is more active when the females are young. The egg stage has shown wide variations under different climatic conditions. The minimum period noted was 4 or 5 days with eggs laid between 25th January and 1st February. Those laid up to 28th April matured in 8 or 9 days. Eggs deposited at the end of May showed a marked increase to 27–31 days for the developmental period, while those laid early in July took 34 days to mature. With eggs laid in March the larval and pupal periods lasted 34–46 days and those in April 68–76 days. The tunnelling by the larvae in the bulbs causes considerable damage. Pupae were found in corms in the field on 30th July. During the cold portion of the year the adults are particularly sluggish. Adults emerging between 16th and 20th April deposited fertile eggs between 26th and 29th May, giving a period of 36–43 days from emergence to mating and oviposition. These adults were bred from eggs deposited between 1st and 13th March, thus giving the period from egg to egg as 72–92 days. The full life-cycle averaged 42·5–51·25 days with eggs laid between 8th February and 13th March, and 78–103 days for those laid between 10th and 18th April. Adults collected in the field had an average maximum length of life of 412·2–420·2 days and those in captivity 170–183·8 days.

Sodium arsenite, in solution or powder, barium chloride or mercuric chloride (corrosive sublimate) in solution, and Paris green, calcium arsenate, lead arsenate and borax as dry powders have been tested for use with baits. The dry powders gave more satisfactory results than the solutions. Paris green was the best, sodium arsenite being next. Borax was a slow poison and yielded fair results. Paris green was diluted with six times its volume of flour, and produced a mortality of 99 per cent. after 3 hours' exposure. Dry sodium arsenite was diluted with three times its volume of flour and produced a mortality of 92 per cent. after 18 hours' exposure. Banana corms were used as the bait in all the experiments.

No trace has so far been found of *Plaesius javanus*, the Histerid beetle imported from Java [*loc. cit.*]. The measures for preventing the weevil from spreading into new plantations and the use of corm baits have already been noticed [*R.A.E.*, A, x, 524, etc.].

JARVIS (E.). **The Influence of Chemotropism on** *Lepidoderma albohirtum*, **Water.**—*Queensland Agric. Jl.*, xviii, pt. 4, pp. 307-311, 1 plate. Brisbane, October 1922.

In 1915 it was discovered that *Lepidoderma albohirtum*, Waterh., reacts negatively to cajeput oil, acetic and carbolic acids, nitro-benzene, oil of almonds, etc., but was not influenced by odours arising from oil of cloves, fish oils or even fumes of 40 per cent. formalin. These experiments were continued in 1921. The anatomy of the antennae is described. There is little doubt that these help the beetle to locate favourite feeding trees, since isolated specimens of such figs as *Ficus pilosa* and *F. cunninghami* are loaded with beetles.

Cotton Research Board. Second Annual Report, 1921.—*Minist. Agric. Egypt*, xvi + 203 pp., 1 map, 7 graphs and diagrams. Cairo, 1922. Price P.T.15.

The entomological section of this report takes the form of a review of current literature relating to cotton pests in Egypt and throughout the world. A brief summary is given of the lines of work to be followed for the suppression of some of the more important pests. Extensive experiments, both in the laboratory and in the field, will be undertaken to determine the effect of food, humidity and temperature on the causation and termination of the resting stage of the pink bollworm [*Platyedra gossypiella*, Saund.], with a view to discovering the optimum treatment of cotton land after harvest in order to reduce to a minimum the resting-stage larvae left on the ground. A new kind of light trap is to be erected to determine the length of flight of *P. gossypiella*, and to find out whether migrations occur in the case of the cutworm, *Agrotis* (*Rhyacia*) *ypsilon*. An attempt is to be made to poison the cotton seed bug, *Oxycarenus hyalinipennis*, by spraying arsenicals on the dew on which it feeds, and it is thought that the pink bollworm and other cotton pests may be affected by the same means.

The cotton legislation passed during 1921 is quoted in an appendix.

Enquête sur la lutte contre la mouche des olives (*Dacus oleae*) **dans les divers Pays.**—vii + 89 pp. Rome, Inst. internat. Agric., 1922. Price Frs. 5.

In southern Europe olive growers suffer enormous losses from the attack of the olive fly, *Dacus oleae*, Rossi. The general meeting of the International Institute of Agriculture in 1920 resolved to collect complete data on the various measures adopted against this fly, especially as regards natural enemies. The various reports form the first section of this publication, nearly all the information given having been included in papers already noticed.

In Spain the eastern part of the country is chiefly affected. Very little has been done to check *D. oleae*, as an interval of three or four years occurs between serious outbreaks, and agriculturists are more concerned about vine and citrus pests. The work of Berlese and Lotrionte on poison baits and of Silvestri on parasites has been chiefly utilised. Large-scale work is being planned with a poison bait

containing anhydrous sodium arsenate (60 per cent. pure) 1 lb., molasses 5 gals., and water 33⅓ gals.

In France no effective means for checking *D. oleae* exist. Poison-baits of the De Cillis and Berlese formulae have been used. At Mentone work has been undertaken on the natural enemies of the fly. Attempts are being made to find a formula free from arsenic, and measures in oil-mills (in which *D. oleae* multiplies rapidly) are being developed, such as the screening of windows, the paving of floors with cement, and the destruction of all residues.

In Algeria the use of baits is proposed. The infestation seems to be local in character and intermittent. In Morocco a study of measures against the olive fly is planned, and in Tunis the authorities are in touch with the Paris Entomological Station and the Mentone Insectarium regarding the parasite, *Opius concolor*.

In British India *D. oleae* has been recorded at Cherat, where it has a Hymenopterous enemy.

In the Union of South Africa *D. oleae* has been noticed on *Olea verrucosa* and has a parasite. The olive is not largely grown, and no special study has been made.

The measures adopted in Italy during the past 20 years and those at present employed are reviewed.

The second section of this publication contains abstracts of papers on *D. oleae* that have been already noticed.

DE JONG (A. W. K.). **De aetherische oliëen leverende planten van Nederlandsch Oost-Indië en de bereiding van haar oliëen.** [Dutch East Indian Plants yielding ethereal Oils and the Preparation of their Oils.]—*Koloniaal Inst., Ber. Afdeeling Handelsmuseum,* no. 7, 183 pp., 49 figs. Amsterdam, 1922.

In general these plants seem to be free from attack by insects. *Chenopodium* injured by a root rot is sometimes infested by termites, and a species of cinnamon (*Cinnamomum cassia*) is defoliated by caterpillars, while its seedlings are bitten off and removed by crickets.

PAILLOT (A.). *Neurotoma nemoralis*, **a Hymenopteron injurious to the Peach-tree, in France.**—*Comptes rendus Acad. Agric. France,* vii, no. 38, pp. 827–831. Paris, 1921. (Abstract in *Internat. Rev. Sci. Pract. Agric.*, xiii, no. 3, p. 429. Rome, March 1922.) [Received 11th December 1922.]

The information given here is substantially the same as that in a paper from another source [*R.A.E.*, A, x, 537].

BARBEY (A.). **The Tussock Moth (*Lymantria monacha*) in Valais, Switzerland.**—*Jl. forestier suisse,* lxxiii, no. 2, pp. 21–25, 1 plate. Berne, February 1922. (Abstract in *Internat. Rev. Sci. Pract. Agric.*, xiii, no. 3, p. 434. Rome, March 1922.) [Received 11th December 1922.]

Liparis (*Lymantria*) *monacha* appeared in Haut Valais in 1921, and in August was found to have invaded the communal forest of Ernen. The infested area was about 2½ acres in extent and at an altitude of about 3,300 feet. Some 60 to 80 years previously it had been planted with *Picea* (spruce), 90 per cent., and *Pinus sylvestris* (Scots pine), 10 per cent. The rains in mid-August hindered swarming and oviposition, but some of the moths had previously oviposited under the

scales and in crevices of the bark of the trees, preferably those severely damaged by the caterpillars. On 15th September countless egg-clusters were found on the tree-trunks in the infested zone.

It is supposed that this moth, which is of sporadic occurrence in Switzerland, succeeded in 1920 (or before) in penetrating into the Rhône valley from the basin of the Lake of Geneva, and that some pairs found their way to the forest in question.

DE JOANNIS (J.). **Revision critique des espèces de Lépidoptères cécidogènes d'Europe et du bassin de la Méditerranée.**—*Ann. Soc. Ent. France*, xci, no. 1–2, pp. 73-155. Paris, 1922.

This revision of the gall-making Lepidoptera of Europe and the Mediterranean is based on the catalogue of Houard, and notes are given explaining divergences from his list. An index to the Lepidoptera and the plants dealt with is appended.

GRASSE (P. P.). **Notes sur la biologie d'un Collembole :** *Hypogastrura armata*, **Nicolet.**—*Ann. Soc. Ent. France*, xci, no. 1–2, pp. 190–192. Paris, 1922.

The Collembolan, *Hypogastrura* (*Achorutes*) *armata*, Nic., has several times been recorded as injurious to cultivated plants, including peas, *Narcissus*, hyacinth and tulip bulbs, and the roots of Cruciferae. The epidermis in every case is found to be pierced, causing the collection of moisture about the wound and the ultimate decomposition of the tissues. The author's observations have led to the conclusion that sound roots or bark are never attacked, the insects always utilising some existing lesion in order to penetrate to the parenchyma. Two factors are indispensable to them, namely, moisture, and softened or decomposing tissue; under these conditions the most varied food-plants are attacked, and other insects invariably follow and increase the injury done by the Collembola. The colonies increase so rapidly that it would seem that parthenogenesis must occur, but this has not yet been proved.

EYER (J. R.). **The Bionomics and Control of the Onion Maggot.**—*Pennyslvania Agric. Expt. Sta.*, Bull. 171, 16 pp., 1 plate, 4 figs. State College, Pa., February 1922. [Received 11th December 1922.]

This paper contains a detailed account of the history and bionomics of *Hylemyia antiqua*, Meig. (onion maggot), together with a description of all stages except the adult. The adults of the first seasonal brood emerge from over-wintering puparia from 29th April to 30th June; the second brood emerges between 1st and 20th July, with a maximum emergence about the 15th; the third brood emerges from 4th September to 28th October. Puparia formed after 30th October do not produce adults until the following spring. It is probable that some of the adults emerging in October hibernate, as flies have been observed in the fields on warm days late in November and again early in April.

The ratio of males and females in captivity was evenly divided, but in the field the females were three times as numerous. The maximum life of the males in the field is about 10 days, and in captivity the females lived 21 days. Observations show that the maximum flight distance is about two miles under favourable wind conditions. The preoviposition period varied from 7 to 21 days, with a general

average of 10 days, but the eggs of hibernating females are retained for six months. Experimentally the oviposition period lasts 4–5 days and in the field 10–15 days. The eggs are laid on the onion plant, basally in the axil or in the crevices of the soil near the stem. Late in the season eggs are deposited directly on the bulb. Each of the three broods is characterised by a period of maximum oviposition, viz., 1st to 10th June, 15th to 30th July, and 4th to 15th September; and the earliest recorded date for the hibernating adults was 25th May. No eggs were observed in the field after 21st September. Experimentally clusters of 7–9 eggs were laid each day for a period of four or five days. In 1919 the incubation period averaged 5·5 days, and in 1920 this was corroborated for the first brood, with 2·7 days for the second and 3·5 days for the third. Moisture seems to affect the percentage of eggs that hatch rather than the period of incubation.

The total length of the larval stage varies from 15 to 25 days, and is influenced by temperature and chiefly by moisture. The larval stage of individuals reared on bulbs in moist soil lasted 18–19 days, and under dry conditions 25 days. Puparia were formed from 27th May to 30th June by larvae from eggs laid by hibernating flies, and the adults emerged after 15–19 days. The second generation puparia were formed from 20th August to 25th September, and adults emerged after 8–14 days. Over-wintering puparia were not usually formed prior to 15th October or later than 10th November under field conditions. Puparia of the first brood were formed 4–5 in. below the surface of the ground and 1–2 in. away from the plant. Those of the second and third generation were found nearer the bulb, usually among its roots and not so far beneath the surface. Larvae feeding within onion bulbs at harvest time often pupated within them and were transferred to storage bins, emerging in the following spring. The larvae pupate 3 or 4 days after the puparium has been formed. Extremes of moisture or temperature had a retarding effect on their development. Severe desiccation often killed the pupae.

There are thus three distinct generations in the field; and a fourth sometimes occurs in stored onions. The majority of the individuals hibernate in the puparium, the length varying from 190 to 210 days. Some of the third generation hibernate as adults.

In Erie County the maggot is restricted to the cultivated onion. The first brood larvae enter the leaf near the axil, where they feed for some time, causing it to turn yellow and collapse. They then enter the immature bulb. Second brood larvae enter the bulb at the maximum growth and do the least damage of all the broods. The third brood larvae enter the bulb just previous to harvest and storage. Sometimes third brood larvae do not hatch till the onions are ready for storage, and, being small, do little damage when the onions are in the field. When in storage they complete their life-cycle and destroy the bulb.

Insect enemies are *Aphaereta muscae*, Ashm., which has been reared from pupae of the third generation; the Carabids, *Euarthrus sodalis*, Lec., *Pterostichus lucublandus*, Say, *P. sayi*, Brullé, and *Platynus cupripennis*, Say, which feed on the adult and larval stages; and the Staphylinids, *Aleochara* sp. and *Xantholinus* sp., which have been observed closely associated with the larval and pupal stages. The field sparrow, *Spizella pusilla*, has been observed feeding on the adults in onion fields.

A number of experiments undertaken in 1918–20 for the control of this pest are described. A poison bait that proved most practical and

efficient on extensive areas was sodium arsenite ¼ oz., molasses 1 U.S. pt., water 1 U.S. gal. [R.A.E., A, vi, 555]. An average increase of 90 bushels per acre was produced in fields where this material was used. The use of bait cans was found to be more effective than the sprinkling method. These were placed 10–15 feet apart in every tenth row. The proper timing of bait applications is important. Cans should be placed in the field after sowing and refilled after heavy rains and during long hot and dry periods. In Pennsylvania May and June are the important months. Carbolic acid emulsion was effective in reducing infestation and produced increases in yield almost as large as the poisoned bait did. The formula recommended for use in gardens or on small plots is ¼ lb. soap dissolved in 1 U.S. gal. hot water, adding ⅛ U.S. pint crude carbolic acid slowly. In spraying care should be taken to keep the liquid thoroughly agitated. The value of this material is influenced by rainfall, and owing to the time and labour spent in frequent treatments it is impracticable for commercial purposes. Strengths exceeding 2 per cent. injure the plants and cannot be used with safety. Sowing carbolated lime and calcium hypochlorite with seed, 2 oz. to a rod, gave promising results. Dry lime-sulphur injured germination and prevented growth. Crop rotation and clean culture help to reduce seasonal infestations. Onion tops and decayed bulbs after harvesting should be removed and burned.

MOTE (D. C.). **Biennial Report of the State Entomologist.**—*12th & 13th Ann. Repts. Arizona Commiss. Agric. & Hortic., 1919–21*, pp. 17–64, 9 figs., 2 maps, 6 tables. Phoenix, Ariz., 1922. [Received 11th December 1922.]

The work of the various inspection services for 1920 and 1921 is reviewed. The insects most frequently intercepted were *Chrysomphalus aurantii* (red scale) and *Lepidosaphes beckii* (purple scale), mostly on citrus fruit. The quarantine and other measures adopted against the Mexican boll weevil [*Anthonomus grandis*, Boh.] are given.

A description of the surveys undertaken against the introduction and spread of the thurberia boll weevil (*A. grandis* var. *thurberiae*, Pierce) and various recommendations are discussed. A notice dated 9th November 1920 prohibiting the growing of cotton in certain areas is given in full. The survey of the *Thurberia* plant has given rise to the discovery of the Thurberia bollworm, *Thurberiaphaga catalina*, Dyar. This bollworm may not become a pest of major importance, but if established may do considerable damage, though it has not yet been recorded on cultivated cotton.

As the alfalfa weevil, *Hypera variabilis* (*Phytonomus posticus*) approaches the northern borders of Arizona, it is becoming more imperative to strengthen quarantine work. The citrus quarantine was amended to place an embargo for the entire State on citrus fruit from Gulf Coast States. Citrus thrips [*Scirtothrips citri*] has been present for several years, and its destructiveness has resulted in extensive spraying measures. Potato growers are urged to take every precaution to prevent the introduction of potato tuber moth [*Phthorimaea operculella*], potato eelworm [*Heterodera radicicola*] and the sweet potato weevil [*Cylas formicarius*]. The measures adopted and proposed against the date palm scale [*Parlatoria blanchardi*], codling moth [*Cydia pomonella*] and San José scale [*Aspidiotus perniciosus*] are given. A summary of the bee disease inspection gives the number of apiaries infected with American foulbrood.

FROST (S. W.). **Lepidoptera injurious to the Apple in Pennsylvania.**—*Pennsylvania Agric. Expt. Sta.*, Bull. 169, 16 pp., 2 plates, 3 figs. State College, Pa., November 1921. [Received 11th December 1922.]

The scars produced by Lepidopterous pests on apple fruit are classed as deep cavities, shallow cavities and pin-hole injury. The early-feeding caterpillars attack the small developing fruit and produce scars that heal, giving a russety appearance, although the fruit outgrows the injury. The later-feeding species are far more serious, as the damage is done when the fruit has stopped growth and the healing of the scars is impossible. The chief pests of this nature are briefly dealt with [*R.A.E.*, A, x, 68]. A key is given to the Microlepidoptera of Pennsylvania that feed on the foliage and fruit of the apple, and is based entirely on larval habits and colour characters. Notes are given on the more important species, considered under the headings of fruit-borers, leaf-rollers, bud-moths and green fruit-worms.

MELANDER (A. F.). **[Report of the] Division of Entomology and Zoology.**—*31st Ann. Rept. Washington Agric. Expt. Sta., Year ending June 30th 1921*, Bull 167, pp. 24–28. Pullman, Wash., January 1922. [Received 11th December 1922.]

Investigations into the best treatment for codling moth [*Cydia pomonella*, L.] show that calcium arsenate is inferior to lead arsenate, magnesium arsenate being still less efficient. The clipper type of nozzle attached at an angle at the end of a long pole directs the spray to better advantage than a spray gun, but the latter is easier to handle, and can be used with success except in particularly bad cases. Ordinary laundry soap at the rate of six bars to 200 U.S. gals. improved the spreading capacity, but did not increase the effect of the spray.

Experiments against San José scale [*Aspidiotus perniciosus*, Comst.] show that there is great variation in susceptibility to sprays in different localities. Dry polysulphides are less efficient than the ordinary lime-sulphur liquid, oil sprays act more rapidly than sulphur sprays, and there is much variation in miscibility and efficiency among commercial oils.

Directions for Spraying Fruits in Illinois.—*Illinois Agric. Expt. Sta.*, Circ. 212, 16 pp., 2 plates. Urbana, Ill., March 1922. [Received 14th December 1922.]

Spray schedules are given for all the commoner fruits, with directions for making and mixing the standard sprays.

PAOLI (G.). **La moltiplicazione dell'endofago della Bianca-rossa in Italia.** [The Increase in Italy of the Endophagous Parasite of *Chrysomphalus dictyospermi*.]—Reprint, 5 pp., from *Il Coltivatore*, no. 33. Casale Monferrato, 30th November 1922.

Aspidiotiphagus lounsburyi, Berl. & Paoli, collected in Madeira [*R.A.E.*, A, xi, 26], has established itself in gardens on the eastern Italian Riviera, and in view of its behaviour during some cold weather in April when it was being distributed, there is hope that it will survive the winter. The author is also breeding *A. lounsburyi* on small palms,

Phoenix canariensis, artificially infested with the scale, *Chrysomphalus dictyospermi*, Morg., his intention being to dispatch such living plants to Sicily and other distant regions and thus overcome the difficulties that have attended the transport of the parasite.

Smith (K. M.). **A Study of the Life-history of the Onion Fly** (*Hylemyia antiqua*, **Meigen**).—*Ann. App. Biol.*, ix, no. 3–4, pp. 177–183, 2 plates. Cambridge, November 1922.

Hylemyia antiqua, Meig. (onion fly) has become so abundant of recent years in Great Britain, and particularly in Lancashire and Cheshire, that in certain districts onion growing is impossible. A description of the stages is given and the life-history is recorded in detail. The length of life of the adult flies under natural conditions could not be determined, but in the laboratory, fed on casein, they lived from three weeks to two months. There are apparently three generations in a season, which overlap, the third being incomplete, the pupae of this generation hibernating and the adults emerging in the following spring. The preferred food is the onion, but leeks, shallots, tulip bulbs and lettuce have all been attacked. Larvae have also been reared experimentally in fresh manure and in radishes. Young onion seedlings are often entirely devoured; in older plants the symptoms are yellowing and wilting of the tops, which finally lie on the ground, while the bulbs decompose. Details of reproduction and oviposition and much of the information given have recently been noticed [*R.A.E.*, A, xi, 67–69].

The preoviposition period is important in view of attempts to use poison bait during oviposition; the author is inclined to consider that this period occupies 7–10 days. Hibernation undoubtedly occurs generally in the pupal condition, but the larvae also are capable of living through the winter. The statement of some authors that the insect hibernates as an adult lacks confirmation. Natural enemies occurring in Great Britain include the Braconid, *Aphaereta cephalotes*, parasitic on the pupae, and the predacious Staphylinid beetle, *Aleochara bilineata*, the larva of which bores its way into the pupal case and feeds on the contents.

Aitson (A. M.). **On the Young Larvae of** *Lyctus brunneus*, **Steph.**—*Ann. App. Biol.*, ix, no. 3–4, pp. 187–196, 2 figs. Cambridge, November 1922.

The first and second instar larvae of *Lyctus brunneus*, Steph., are described, with notes on certain parts of the anatomy of the larvae of later instars.

Jewson (S. T.) & Tattersfield (F.). **The Infestation of Fungus Cultures by Mites. (Its Nature and Control, together with some Remarks on the toxic Properties of Pyridine.)**—*Ann. App. Biol.*, ix, no. 3–4, pp. 213–240, 4 figs. Cambridge, November 1922.

Mites having proved a serious pest of fungus cultures, a study was made of the nature of the infestation and of the toxic effect of a number of volatile organic chemical compounds on these pests and on fungi. The mites most frequently occurring are *Tyroglyphus* (*Aleurobius*) *farinae* and *T. longior*, with occasional infestation by *Glyciphagus cadaverum*. It was found that they can be controlled by exposing the cultures to pyridine vapour, after which the fungi can be subcultured safely.

The method was to place the cultures in a bell-jar of about 20 litres capacity with about 20 cc. of commercial pyridine under a wire gauze cover, exposing them to the vapour for about 16 hours. For cleaning out infested laboratory apparatus, strong ammonia can be used, but this should not be allowed to come into contact with fungus cultures for any length of time. The toxic action of pyridine on both mites and fungi is discussed.

MORRIS (H. M.). **The Insect and other Invertebrate Fauna of arable Land at Rothamsted.**—*Ann. App. Biol.*, ix, no. 3–4, pp. 282–305, 7 figs. Cambridge, November 1922.

With the object of ascertaining what species of insects and other invertebrates are present in the soil of an arable field, samples of soil were taken from two plots at Rothamsted Experimental Farm and all insects and invertebrates were recorded, with the approximate depths at which they occurred. A list of all species found is given. One of the plots had received 14 tons of farmyard manure per acre per annum since 1843, the other had received no manure of any kind since 1839. In the former, about 15,100,000 invertebrates were found per acre, of which 7,720,000 were insects ; in the latter, about 4,950,000 invertebrates occurred per acre, of which 2,470,000 were insects. The majority occurred in the upper three inches of soil, but some species were found in larger numbers at greater depth, most of the Elaterid larvae being at a depth of five to seven inches, and those of Symphyla at seven to nine inches. Some species, such as larvae of Chironomids and *Trichocera*, were practically confined to the plot that had been manured ; others, such as the Collembola, *Onychirus ambulans* and *O. fimetarius*, occurred in both plots, but were considerably more numerous in the manured one. None of those present only in the manured plot could be considered directly injurious to growing crops, they being largely saprophagous ; injurious insects, such as larvae of Elaterids, Tipulids and Hepialids, seemed to be little affected by manurial treatment, and occurred in practically equal numbers in either plot. A notable exception, however, was the Diplopoda, the numbers of which increased by about 200 per cent. in the manured plot.

ROBERTS (A. W. R.). **On the Life-history of " Wireworms " of the Genus** *Agriotes*, **Esch., with some Notes on that of** *Athous haemorrhoidalis*, **F., Part iii.**—*Ann. App. Biol.*, ix, no. 3–4, pp. 306–324, 2 plates, 1 fig. Cambridge, November 1922.

A study of the life-history of *Agriotes sputator*, L., shows it to resemble closely that of *A. obscurus*, L. [*R.A.E.*, A, viii, 137], though it is apparently shorter by a year. Pupation probably occurs during the fourth year, the adult emerging four years after the hatching of the egg. The life-cycles of various species of *Agriotes* differ considerably ; *A. sordidus* is said to occupy only one year in the larval stage, while *A. mancus*, Say, in the Northern United States, has been observed to pupate after three years. *A. sputator* seems to require somewhat milder conditions than *A. obscurus*, although the two frequently occur together. The stages of *A. sputator* are described, the larval instars being compared with those of *A. obscurus* and other allied species.

A. acuminatus, Steph. (*sobrinus*, Kies.) is generally found in the adult stage frequenting woody places and flowers, especially Umbelliferae. The natural habitat may be woods ; none has yet been bred

by the author from larvae taken in agricultural land. The egg and first larval instar are described.

Athous haemorrhoidalis, F., is also described in the immature stages. The larvae are frequently found with those of *Agriotes sputator* and *A. obscurus*, but in smaller numbers, so that the damage is of minor importance. Potatoes and tomatos in greenhouses are the most severely damaged. The life-history is probably as long as that of *A. obscurus*. Pupation occurs in August, the adults emerging after about three weeks, but remaining in the soil during the winter and appearing in May.

Corymbites cupreus, F., is a mountain species throughout temperate and central Europe. The larva is commonly found in turf and under stones, and some damage may be done, as in captivity the larva feeds on the roots of various plants. It has also been recorded as feeding on larvae of *Aphodius*. After two moults, it pupates in an earthern cell in the ground in July or August, emerging as an adult in about three weeks but remaining in the ground during the winter. The larva is described.

Henriksen's generic table of the larvae of British Elaterids is reproduced.

SMITH (G. D.). **Preliminary Report upon an improved Method of controlling the Boll Weevil.**—*Qtrly. Bull. State Plant Bd. Florida*, vii, no. 1, pp. 1–64, 13 figs. Gainesville, Fla., October 1922.

A study of boll-weevil conditions in Florida suggested that the first generation of weevils could be destroyed by stripping from the cotton plants the first squares of the season, and with them the eggs deposited by the weevils after hibernation. Care must be taken that all weevils are out of their winter quarters before this is done. In normal seasons the squares should be removed between June 5th and 8th, and this should be followed by a thorough application of calcium arsenate or lead arsenate at the rate of 5–7 lb. per acre, using a suitable dusting machine. The weevils, deprived of squares in which to hide and feed, will attack the terminal buds for food, and these buds can easily be filled with poison by means of a dust gun. This method has been found to destroy practically every weevil that had escaped capture in the stripping operation. A table recording emergences of the weevils at various places shows that 99 per cent. are out of hibernation and in the cotton fields by 5th June. In order to get the plants into the right fruiting stage for treatment, non-fertilised cotton should be planted about the last week in March. If much fertiliser is used, planting should be done one week later. If the season is unusually late, the treatment should be delayed for a few days, until enough squares have appeared on the plants to act as traps for the adult weevils.

The effect of stripping the squares on the yield of cotton is discussed, and the life-history of the weevil under Florida conditions, with a view to satisfactory application of the remedies, is dealt with. The second generation of weevils matures about 5th August at the earliest, and by this time the Florida crop of short staple is sufficiently matured to escape practically all damage by the weevils. Many field tests with these methods are recorded in detail, and the best methods of removing the squares and of applying the poison are explained.

Another Insect Pest threatens.—*Qtrly. Bull. Florida State Plant Bd.*, vii, no. 1, p. 64. Gainesville, Fla., October 1922.

Attention is called to the danger of the introduction into Florida of *Pseudaonidia duplex*, Ckll. (camphor scale), of which the preferred food-plant is *Citrus*, and which is much more difficult to control than the Coccids already occurring there. Hundreds of other trees and shrubs also serve as food-plants, including forest and cultivated kinds. It has now been recorded from Louisiana and Alabama, and a Federal quarantine may be imposed against it; in the meantime, careful inspection in the State is being maintained.

O'Byrne (F. M.). **Florida Nursery Inspection Law briefly summarised.** —*Qtrly. Bull. Florida State Plant Bd.*, vii, no. 1, pp. 70–71. Gainesville, Fla., October 1922.

A summary is given of the regulations concerning the movement of nursery stock in the State of Florida.

Catoni (L. A.). **Plagas de insectos que atacan a los árboles del género citro en Puerto Rico y cómo combatirlos.** [Insect Pests of Citrus Trees in Porto Rico and how to combat them.]—*Rev. Agric. Puerto Rico*, v, no. 4, pp. 35–39. San Juan, P. R., 30th October 1920. [Received 18th December 1922.]

The following pests of *Citrus* were specially studied in 1918 in Porto Rico. Coleoptera: *Pachnaeus* sp., *Lachnosterna* (*Phyllophaga*) *citri* and *Diaprepes abbreviatus*. Lepidoptera: *Papilio androgeus*. Hymenoptera: *Solenopsis geminata*. Rhynchota: *Aleurothrixus* (*Aleurodes*) *howardi*, *Lepidosaphes beckii*, *Chionaspis citri* and *Saissetia hemisphaerica*. Acarina: *Tetranychus* sp. and *Eriophyes oleivorus*. In each case a brief note on the life-history and remedial measures is given.

Catoni (L. A.). **Plagas de insectos que atacan la planta del algodón y cómo combatirlos.** [Insect Pests of Cotton and how to combat them.]—*Rev. Agric. Puerto Rico*, vi, no. 3, pp. 25–31. San Juan, P. R., 30th March 1921. [Received 18th December 1922.]

Some of the species dealt with do not occur in Porto Rico, while others have been noticed previously [*R.A.E.*, A, viii, 303]. A scale, *Hemichionaspis minor*, is very common in the island, attacking cotton as well as other plants. Kerosene emulsion is advised against it.

Wolcott (G. N.). **Las plagas del cacao en Santo Domingo y algunas indicaciones para combatirlas.** [Cacao Pests in San Domingo and some Information on Measures against them.]—*Rev. Agric. Puerto Rico*, vi, no. 6, pp. 11–12. San Juan, P. R., 30th June 1921. [Received 18th December 1922.]

Cacao in the Dominican Republic is attacked by a number of enemies. A Dynastid beetle, *Strategus titanus*, F., destroys the roots of plants grown in virgin soil. A species of *Stephanoderes* occurs on mummified pods, but is not injurious. The caterpillars of *Bocchoris pharaxalis*, Druce, feed on the tender leaves of the shoots. The most serious damage is due to an Aphid, *Toxoptera aurantii*, Boyer, and a mealy-bug, *Pseudococcus citri*, Risso. The former attacks young and tender leaves, the flower-buds and the pod-stalks, and the latter occurs

on the stalks of the buds, flowers and pods and on the pods themselves, especially where two are touching each other or one touches the trunk. The buds rot without unfolding, the flowers rot and fall, and the pods mummify. Both of these pests are tended by *Solenopsis geminata*, F. This ant may be prevented from ascending the trees by an adhesive band, or its nests may be flooded with an emulsion of carbolic acid and soap.

CATONI (L. A.). **Plagas de insectos que atacan la palma de coco.** [Insect Pests of the Coconut Palm.]—*Rev. Agric. Puerto Rico*, vii, no. 3, pp. 21–25. San Juan, P. R., 30th September 1921. [Received 18th December 1922.]

The insect pests of coconut in Porto Rico include the Coccids, *Aspidiotus destructor, Vinsonia stellifera* and *Pseudococcus nipae*. The first two may be checked by removing and burning all infested leaves or by spraying with kerosene-soap emulsion, while *P. nipae* requires either kerosene-soap or a jet of water under high pressure. *Aleurodicus cocois* (coconut whitefly) may be checked with any good soap-oil emulsion, but in the case of old palms it is better to burn all infested leaves.

The termite, *Eutermes morio*, is best dealt with by destroying its nests. Poison-baits, such as a mixture of arsenic and sugar, are also effective. Two Lamellicorns, *Strategus quadrifoveatus* and *Lachnosterna (Phyllophaga) portoricensis*, are common, and are very injurious in the larval stage. The adults may be trapped by means of a light placed over a container filled with water, but the best measure is the elimination of all places likely to shelter them. Poison-baits of a greasy nature may be used for the larvae. A Curculionid, *Metamasius hemipterus*, causes considerable harm, the larva being often found boring in the trunks. Infested palms should be entirely destroyed by burning, and the adult weevils may be captured in light-traps. A Scolytid, *Platypus* sp., bores into the wood in order to oviposit, and is thought to favour fungous infection. The adults may be caught in light traps, or the trunks may be smeared with a greasy poison-mixture, or infested trunks may be burned.

CATONI (L. A.). **Plagas de insectos que atacan la planta del tabaco.** [Insect Pests of Tobacco.]—*Rev. Agric. Puerto Rico*, vii, no. 5, pp. 45–50. San Juan, P. R., 30th November 1921. [Received 18th December 1922.]

Most of the Lepidopterous pests of tobacco in Porto Rico have already been dealt with [*R.A.E.*, A, xi, 58].

Acrocercops sanctaecrucis (tobacco leaf-miner) has sufficient natural enemies to render remedies unnecessary. Coleopterous pests are two Halticids, *Epitrix parvula* and *E. cucumeris*, the adults of which injure the leaves and the larvae the roots. Egg-plants and tomatos are also attacked. A spray containing lead arsenate and slaked lime may be used, and weeding should be done after harvesting. Against the mole-cricket, *Scapteriscus vicinus*, which feeds on the roots and leaves, a bait of flour 100 parts by weight and Paris green 3 parts is advised. Two Capsid bugs, *Dicyphus luridus* and *D. prasinus*, attack tobacco and other Solanaceous plants throughout the island, the former being the more common. Spraying with soap or kerosene emulsions, covering the plants with mosquito net, and destroying weeds, are the measures advised.

Luciano (J.). **Plagas de insectos dañinos al hogar y medios para combatirlos.** [Indoor Insect Pests and Measures to combat them.]—*Rev. Agric. Puerto Rico*, viii, no. 1, pp. 27–36. San Juan, P. R., January 1922. [Received 18th December 1922.]

The measures usually found effective against indoor insect pests are given, the species dealt with including the cockroaches, *Periplaneta americana* and *P. australasiae*; a cricket, *Amphiacusta caribbea*; the ants, *Solenopsis geminata*, *Tapinoma melanocephalum* and *Prenolepis longicornis*, of which the first-named is the most troublesome, attacking persons as well as food-stuffs; and the termites, *Eutermes morio* and *Cryptotermes brevis*, which are very injurious. In each case there is a brief note on biology and the damage done.

Catoni (L. A.). **Informe de las actividades de la campaña de eradicacion del gusano rosado en Puerto Rico llevada a cabo por el Departamento de Agricultura y Trabajo.** [Report on the Work in the Campaign against the Pink Bollworm in Porto Rico conducted by the Department of Agriculture and Labour.]—*Rev. Agric. Puerto Rico*, viii, no. 4, pp. 15–22, 2 maps. San Juan, P. R., April 1922. [Received 18th December 1922.]

The pink bollworm of cotton, *Platyedra* (*Pectinophora*) *gossypiella*, Saund., was observed in Porto Rico in July 1921 [R.A.E., A, ix, 560], having probably been introduced in seed from Santa Cruz. In September 1921 the first inspections were made, and the pest was found to occur throughout the cotton districts. Growers were instructed regarding the situation, all seed for the next crop was ordered to be fumigated with carbon bisulphide, and the destruction of old plants, seed, wild cotton and other Malvaceous plants was planned. The results will only be apparent in the coming crop. Under the quarantine law of 27th May 1919 the importation of uncertificated cotton seed from countries where cotton diseases and pests exist is prohibited.

Brau de Zuzuarregui (M.). **Pájaros útiles y perjudiciales a la agricultura.** [Birds beneficial and injurious to Agriculture.]—*Rev. Agric. Puerto Rico*, viii, nos. 5 & 6, pp. 13–18, 27–32, ix, nos. 2 & 3, pp. 25–31, 17–20, 11 figs. San Juan, P. R., May, June, August, September 1922. [Received 18th December 1922.]

The birds of Porto Rico are decreasing, chiefly owing to the introduction of the mongoose in 1876. Brief accounts are given of the various insectivorous species that merit protection, including *Tyrannus magnirostris*, which is the principal enemy of the changa [*Scapteriscus vicinus*, Scud.], *Quiscalus niger*, an important enemy of *Diatraea saccharalis*, F., *Heliothis obsoleta*, F., and *Laphygma frugiperda*, S. & A., and *Crotophaga ani*, considered to be the chief enemy of *Lachnosterna*.

Catoni (L. A.). **Plagas de insectos que atacan a las plantaciones de batata.** [Insect Pests of Sweet Potato Plantations.]—*Rev. Agric. Puerto Rico*, ix, no. 3, pp. 25–28. San Juan, P. R., September 1922. [Received 18th December 1922.]

The insect pests of the sweet potato in Porto Rico include the weevils, *Euscepes batatae* and *Cylas formicarius*. A Halticid, *Chaetocnema amazona*, which feeds on the foliage, may be checked by spraying with

Paris green or lead arsenate. A Sphingid, *Protoparce cingulata* defoliates the plants; it may be dealt with by spraying with Paris green and lime and is parasitised by a fly, *Sturmia distincta*. Against a thrips, *Euthrips insularis*, and a mite, *Tetranychus* sp., dusting with lime-sulphur is advised.

CATONI (L. A.). **Medidas para combatir las plagas de insectos.** [Measures against Insect Pests.]—*Rev. Agric. Puerto Rico*, ix, no. 4, pp. 33-36. San Juan, P. R., October 1922.

The stomach poisons briefly described in this article are lead arsenate, Paris green and London purple. Lead arsenate is slow-acting owing to its insolubility, but is not destructive to plant-tissue. Paris green is a compound of arsenic, copper and acetic acid. A good quality must contain 56 per cent. of arsenic, of which only 5 per cent. must be soluble or the plant will be injured. It is used mixed with lime. A dust containing 3 lb. Paris green to 100 lb. wheat flour is effective against *Scapteriscus vicinus* (*didactylus*). London purple is a compound of arsenic and lime to which some colouring matter has been added. Though the percentage of arsenic is smaller than in Paris green, the arsenic is more soluble, so that either may be used indifferently, and in the same manner.

The contact poisons dealt with are whale-oil soap emulsion; turpentine mixture containing 4 lb. resin and 3 lb. sodium carbonate in 30 U.S. gals. water; turpentine and whale-oil soap mixture containing 4 lb. resin, 3 lb. sodium carbonate, and 10 lb. whale-oil soap in 50 U.S. gals. water; kerosene emulsion, prepared by dissolving ½ lb. soap in 1 U.S. gal. water and mixing with 2 U.S. gals. kerosene, this stock being diluted for use with water up to 33 U.S. gals.; crude oil and whale-oil soap mixture, for which 4 oz. naphthaline is mixed with 5 U.S. pints crude (petroleum) oil and added to 10 lb. whale-oil soap, the paste thus obtained being dissolved for use at the rate of 1–3 lb. to 10 U.S. gals. water; and tobacco-soap emulsion, which is cheap and easy to prepare, containing ½ lb. tobacco waste and ½ lb. soap in 5½ U.S. gals. water.

THEOBALD (F. V.). **The Apple and Plum Case Bearer** (*Coleophora nigricella*, **Stgch.) and its Treatment.**—Reprint from *Jl. Pomology & Hortic. Sci.*, 7 pp., 7 figs. [*Sine loco*] December 1922.

During the last two or three years in Britain apple and plum have been infested with *Coleophora nigricella*, Stgch. (apple and plum case-bearer), which is innocuous in small numbers but may become a serious pest. The damage done is mainly to the buds and young leaves, and if the larvae are abundant, the foliage and blossom may be completely destroyed. Attacked trees have a marked scorched and shrivelled appearance. The fruit may be attacked both when young and when nearing maturity, especially in the case of cherries. A brief description is given of the adult, egg, larval cases and larva.

The adults emerge during July, and live 10–21 days. Eggs are laid under the leaves, especially the topmost leaves of the shoots, and are embedded among the leaf hairs. This stage lasts about two weeks. At first the larvae do little damage, but they become active in spring. By May some of the larvae have reached their final stage, and when nearly mature they may be carried by wind to other trees. So far the author has not bred a single parasite, but in Canada Chalcids have been found on related species.

The plants attacked are apple, plum, damson, cherry, sloe, and bullace. The insect is uncommon on pear in Britain, but has been recorded on medlar, hawthorn and birch trees.

Winter spraying is useless, and experiments with lead arsenate and calcium arsenate in the spring were ineffective; but 1 oz. 96 per cent. nicotine, ½ lb. soft soap and 10 gals. water killed over 80 per cent. of the larvae, and 1 oz. nicotine sulphate, ½ lb. soft soap and 10 gals. water over 90 per cent. The latter took 48 hours longer to have the same effect as the former, but the effect on some Aphids was greater. It is essential to mix nicotine sulphate with soft soap.

Plantation Diseases and Pests Ordinance, 1916.—Extract from *Govt. Gaz., New Guinea*, no. 43, 1922. [Received 16th January 1923.]

Attention is drawn to the Plantation Diseases and Pests Ordinance, 1916, of the 14th August 1916, especially to the sections dealing with the notification of suspected or proclaimed pests, the employment of remedial measures, the removal and destruction of dead coconut palms or any substance liable to harbour or become breeding-places for proclaimed pests, and the right of inspectors. Under the proclamation of pests thereunder of the 15th August 1916 the proclaimed pests are *Brontispa froggatti* (leaf Hispid), *Promecotheca opacicollis* (new Hebrides leaf beetle), *P. antiqua* (Solomon Island leaf beetle) and *Aspidiotus destructor* (transparent coconut scale). This proclamation also gives a full description of each insect and the approved remedial measures. The Regulations thereunder of the 26th January 1920 prohibit the sending of any part of a coconut tree except manufactured copra from one district to another, excepting husked nuts for food and seed nuts accompanied by a certificate.

Barber (H. G.) & Weiss (H. B.). **The Lace Bugs of New Jersey.**—*New Jersey Dept. Agric., Bur. Statis. & Inspec.*, Circ. 54, 24 pp., 8 figs. Trenton, N.J., June 1922. [Received 19th December 1922.]

A brief account is given of the lace bugs (Tingidae) of New Jersey, many of which are found in nurseries and some of which occasionally do considerable damage. The species dealt with are *Corythuca ciliata*, Say (sycamore lace bug); *C. arcuata*, Say (oak lace bug); *C. pergandei*, Heid. (alder lace bug); *C. marmorata*, Uhl. (chrysanthemum lace bug); *C. contracta*, O. & D. (walnut lace bug); *C. celtidis*, O. & D. (hackberry lace bug); *C. bulbosa*, O. & D. (bladdernut lace bug); *C. associata*, O. & D. (wild cherry lace bug); *Stephanitis pyrioides*, Scott (azalea lace bug); *S. rhododendri*, Horv. (rhododendron lace bug); *Gargaphia tiliae*, Walsh. (linden lace bug), and *Leptoypha mutica*, Say (fringe tree lace bug).

A list of the Tingidae of New Jersey (numbering 29 species), with notes on the synonymy and food plants, is contributed by H. G. Barber, with a key to the families.

Hawley (I. M.). **The Sugar-beet Root-maggot (*Tetanops aldrichi*, Hendel), a new Pest of Sugar-beets.**—*Jl. Econ. Ent.*, xv, no. 6, pp. 388–391. Geneva, N.Y., December 1922.

In July 1920 larvae of the Ortalid, *Tetanops aldrichi*, Hendel, were found destroying sugar-beets in Utah. They have also been reported locally in Idaho. The larvae have not previously been observed.

They are of the typical Dipterous form. They feed on the tap-root, and if the beets are small, the roots are entirely eaten through. The first indication of their presence is the wilting of the plants. Sixty-four larvae have been found around one plant. A single one can destroy a seedling, and three or four can kill a beet. The greatest damage occurs after thinning during the end of June.

Observations on the life-history show that in July the larvae are nearly full-grown, and are inactive at a depth of 3 in. in the ground, and from 1 to 6 in. from the foodplant. They were found at a depth of 4 to 13 in. in September. Hibernation apparently occurs in the larval stage. Puparia were never deeper than 3 in. and often only just below the surface. The average pupal period was determined as 14 days, and it would appear that pupation in 1922 occurred mostly during the second and third weeks of May. By 22nd May adults had emerged from pupae collected on 15th May. On 1st June eggs were found in the laboratory and in the fields the next day. In loose ground these are deposited singly or in lots of 2–40 in the crevices of the soil near a plant, and in compact ground just beneath the surface of the ground near the plant and rarely more than 1 in. from it. Most of the eggs were deposited from 1st to 8th June and had hatched by the 14th. Eggs were also abundant around lamb's-quarters (*Chenopodium album*), red root (*Amarantus retroflexus*) and the prostrate pigweed (*A. blitoides*). By 14th June a few larvae began feeding on the tap-root, some as deep as 3 in. The pre-oviposition period was found to average 10 days, and the egg stage covers 5, so that the larvae begin feeding approximately two weeks after the adults emerged.

In nearly all severe infestations the soil has been sandy or a sandy loam, though the larvae have been occasionally found in heavier soils. They thrive where the moisture content is low. A few flies have been found in the fields in August, and it would appear that a small second brood occurs in most years. A heavily infested field in 1921 was sown with wheat; in the spring adults were abundant, and some eggs were found on weeds, but none on the grain itself. The nearest beet field was 220 yards away and here flies and eggs were unusually abundant.

Solutions of corrosive sublimate and other materials were placed round the plant on 6th June, but their effect cannot yet be observed. It is thought that this Ortalid will become a very serious beet pest.

LARSON (A. O.). U.S. Bur. Ent. **Metallic Mercury as an Insecticide.**—*Jl. Econ. Ent.*, xv, no. 6, pp. 391–395. Geneva, N.Y., December 1922.

Experiments on the effect of metallic mercury on eggs of *Bruchus quadrimaculatus* are described. When eggs were placed in a jar with about a thimbleful of mercury in no instance were embryos found to have developed, and further experiments confirmed this result. In another case larvae placed in a vial containing half a thimbleful of mercury were also killed.

In these experiments the presence of the mercury was the only possible cause of the failure of the eggs and larvae to develop. Owing to the initial cost of mercury its use may not be practicable in warehouses, but is of scientific interest, and it may be utilised as an economical means of combating other insects. The author has had no opportunity of trying it against clothes moths, but sees no reason why it should not be successful.

DURUZ (W. P.). **Peach Twig-borer Experiments in California.**—*Jl. Econ. Ent.*, xv, no. 6, pp. 395-400, 1 plate, 3 tables. Geneva, N.Y., December 1922.

The loss in shipping and canning fruits in California in 1920 and 1921 due to the damage by *Anarsia lineatella*, Z. (peach twig-borer) was estimated at between 20 and 60 per cent. of the crop. Experiments were undertaken to attempt to solve such problems as to whether lime-sulphur sprays effectively control the pest, what are the relative values of lime-sulphur, its substitutes and other spray materials now in use, what is the best time to spray, and whether there is a second generation or only one, irregular brood.

Spraying experiments on young almond trees, begun in 1920, prove that nicotine sulphate and zinc arsenite give excellent control when applied as the buds swell and again at full bloom. Lime-sulphur was not entirely successful, and its substitutes and oil sprays were ineffective. The summary of these experiments are given in tabular form, but it is too early to report the result of all the 1922 experiments. Liquid lime-sulphur gave an average control of 88 per cent., 86·6 per cent. and 83·2 per cent. at the three different stages, the first being when the trees were dormant. The addition of lead arsenate increased efficiency in the full-bloom spray. Arsenicals were highly efficient when spraying was done at the blooming period ; when applied early the rains washed them off before the caterpillars emerged. Nicotine sulphate gave a higher average control than any other spray tested, but is most effective during full bloom.

To prove the existence of a second generation, infested shoots were counted between 1st and 21st April in comparing effectiveness of the spray treatment. A second count was made between 10th and 13th June. There was an average of five larvae per tree at the first count and after the 21st April they had all pupated. At the second count, an average of 12·5 larvae per tree was found. Sprayed trees, some of which showed no infestation in the first count, had the same average number per tree as the unsprayed trees. The increase in number and spread of attack is attributed to egg laying and the flight of the moths. This is conclusive proof of the existence of a second definite generation. The author also believes that there is a third distinct generation, but has no positive data.

The results of two years' investigations are not conclusive enough to warrant definite recommendations. Lime-sulphur alone cannot be regarded as a satisfactory remedy. The addition of lead arsenate, neutral or basic, or nicotine sulphate to lime-sulphur, applied as near the pink stage as possible, is the most effective at the present time. If lime-sulphur spraying is not necessary for fungous diseases, nicotine sulphate at blooming time is recommended. As there is a second generation, one spraying may not be sufficient. A spray applied in the middle of May will probably reduce the damage to fruit.

QUAYLE (H. J.). **Resistance of certain Scale Insects in certain Localities to Hydrocyanic Acid Fumigation.**—*Jl. Econ. Ent.*, xv, no. 6, pp. 400-404, 1 table. Geneva, N.Y., December 1922.

For some years past unsatisfactory results have been obtained in fumigating for *Chrysomphalus aurantii*, Mask. (citrus red scale) in Corona, California, and also in Orange County. It is suspected that this is due rather to the scale being more difficult to kill in these districts than to inefficient measures. Evidence extending over 7 years

at Corona and 4–5 years in Orange County indicate that it is not necessarily a seasonal condition. If it is a case of acquired immunity and the factor of resistance is hereditary, this factor must be transmitted through two or three generations of scales, since this number intervenes between fumigations. There is some evidence to indicate that individuals alive after one fumigation are more resistant to a second. Greatest resistance is shown by scales on trees that have been regularly fumigated once or twice a year. The variable factors of time and place affecting the results of fumigation have to do chiefly with conditions of humidity and wind, and also with the amount of foliage on a tree, as foliage absorbs hydrocyanic acid. It was found that the proportion of scales killed was approximately 5½ per cent. greater when there were no leaves.

Scales are more difficult to kill on the fruit and on vigorous shoots and leaves than on twigs or the leaves on them. This difference in resistance on different parts of the tree seems to be related to the food-supply of the scale. Certain stages of the scale show more resistance than others. The moulting period, particularly the second moult, and the adult or young-producing period, are the two most resistant stages, especially the former.

In 1915 attention was called to the difficulty in killing the black scale [*Saissetia oleae*, Bern.] in the vicinity of Charter Oak, California. Comparative fumigation tests were impossible, as this scale does not infest the fruit, but experiments of the past six years show that this pest is much more difficult to kill in that district than elsewhere. Even small scales were not killed with dosages greatly in excess of the ordinary amount. In these localities neither of these scales are immune from hydrocyanic acid, but the dosage required for satisfactory results is such as to render it unsafe for the tree except under the most favourable conditions.

Severin (H. H. P.) & Basinger (A. J.). **Facts concerning Migration of Beet Leafhopper (*Eutettix tenella*, Baker) in Sacramento Valley of California.**—*Jl. Econ. Ent.*, xv, no. 6, pp. 404–411, 4 tables. Geneva, N.Y., December 1922.

It has been reported that *Eutettix tenella*, Baker (beet leafhopper) has not been found, except in periods of abundance, in the inland regions north of Sacramento. The first appearance of this leafhopper and the average percentages of curly leaf in the various districts for the past few seasons are given, also the average number of tons per acre of sugar-beet harvested in Sacramento and San Joaquin Valleys. As in 1918-20, no first brood adults were found wintering over on the foothills during 1920–21. The species of Chenopodiaceae from which the leafhopper has been bred are given, with a comparison of the humidity, sunshine and temperature in its migratory and natural breeding areas. In all probability the exterminating factor of the overwintering leafhopper in the Sacramento Valley is humidity, the hot dry summers being favourable to the migrant and later generations in the cultivated area.

Severin (H. H. P.) & Basinger (A. J.). **Facts concerning Natural Breeding Area of Beet Leafhopper (*Eutettix tenella*, Baker) in San Joaquin Valley of California.**—*Jl. Econ. Ent.*, xv, no. 6, pp. 411–419. Geneva, N.Y., December 1922.

The frequent occurrence of curly leaf due to *Eutettix tenella*, Baker (beet leafhopper) has caused the closing of sugar factories after

some beds completely ruined. In July and August they are abundant about the District of Columbia. The distribution of this beetle has been recorded as from Georgia to Arizona, and its range in the east extends from Maryland to Florida.

ALLDER (C. T.). **Insectes et Maladies.**—*4e Rapport Sta. Agron. Guadeloupe, 1921-22*, pp. 18-19. Pointe-a-Pitre, 1922.

Diatraea saccharalis, F. (sugar-cane moth borer) is the chief cause of loss to the local sugar-cane crops. The necessity for collecting the eggs has been repeatedly urged. Only healthy canes should be selected and these should be dipped in Bordeaux mixture before being planted. The Aphid, *Sipha flava*, Forbes, continues to attack the young seedlings, but is not usually too numerous to be dealt with by brushing the leaves; as, however, it has recently been found to be a carrier of mosaic disease, very stringent measures must be adopted to prevent the introduction of the disease into the Island, where it would certainly spread with alarming rapidity.

LARRIMER (W. H.). U.S. Bur. Ent. **Occurrence and Control of the Corn Ear Worm in Alfalfa.**—*Canad. Ent.*, liv, no. 8, pp. 169-170. Orillia, August 1922. [Received 19th December 1922.]

Heliothis obsoleta, F. (corn ear worm), was very abundant over the central United States during 1921 and became a very serious pest late in the season, being particularly destructive to young lucerne fields.

In spite of extremely unfavourable weather conditions, poison bran mash proved a successful remedial measure in Michigan. It was applied at the rate of 25 lb. of bran, ¾ lb. Paris green, 2 U.S. qts. molasses and about 3 U.S. gals. water, to 5 acres. The poison was applied at noon on 3rd October, and this was repeated after an interval of a week. After the first treatment, 75 per cent. of the larvae were found dead on the ground, and very few survived the second. Under favourable conditions, one treatment would probably be sufficient. The larvae were also found in autumn-sown rye.

CHITTENDEN (F. H.). U.S. Bur. Ent. **List of Natural Enemies of the Celery Leaf-tyer** (*Phlyctaenia rubigalis*, Guen.).—*Canad. Ent.*, liv, no. 8, p. 174. Orillia, August 1922. [Received 19th December 1922.]

The following are recorded as parasites of *Pionea* (*Phlyctaenia*) *rubigalis*, Guen. (according to C. Heinrich, the American species must be known by this name, as *P. ferrugalis*, Hb., does not occur in America): *Synetaeris* sp., *Pimplidea sanguineipes*, Cress., *Rogas rufocoxalis*, Gahan, *Campoplex* (*Omorgus*) *phthorimaeae*, Cushm., *Amorphota infesta*, Cress., *Meloborus* sp.; *Trichogramma minutum*, Riley; *Syntomosphyrum modestum*, Houd., and *Dibrachys boucheanus*, Ratz.

TOTHILL (J.). **Some Notes on the Natural Control of the Cecropia Moth.**—*Proc. Acadian Ent. Soc. 1921*, no. 7, pp. 30-36. Truro, N.S., June 1922. [Received 19th December 1922.]

The larvae of *Samia cecropia* consume such an amount of food and increase so rapidly that they are a constant menace, although natural control has until now been maintained in New Brunswick. The eggs, of which an average of about 300 are deposited by each female, are scattered, a few being laid on each tree. Perhaps 5 per cent. of them

may be parasitised by Hymenoptera. Little is known of larval parasites, though many mature larvae are attacked by a disease. The larvae, and to a greater extent the pupae, are destroyed in large numbers by birds, especially woodpeckers. Parasites of the pupae include *Ophion macrurum*, *Spilocryptus extremis*, *Diglochis omnivorus*, *Tachina* sp., and *Achaetoneura frenchi*.

GORHAM (R. P.). **Notes on the Pine Needle Scale and one of its Enemies.** —*Proc. Acadian Ent. Soc. 1921*, no. 7, pp. 37–41. Truro, N.S., June 1922. [Received 19th December 1922.]

Chionaspis pinifoliae, Fitch (pine needle scale) is known to occur in two localities in New Brunswick, and has been reported on spruce and pine. The complete life-history has not been worked out for that region. Hibernation generally takes place in the egg-stage, but not always, and overlapping of different generations may extend to and include winter as well as summer stages. The food supply is evidently a governing factor in determining the rate of reproduction and number of eggs laid; when two scales are present on one needle, the egg-producing capacity of each is reduced by approximately one-third, while a greater number still further reduces it more or less proportionately.

Two insect enemies of the scale were observed—one a Hymenopterous parasite that hibernates in a small cocoon beneath the scale, and the other the larva of the Coccinellid, *Microweisia marginata*, which has not previously been recorded in New Brunswick. These larvae hibernate under the scales and feed during the spring by puncturing and sucking the eggs. A single larva was observed to destroy 22 eggs in three hours. The method of attacking the smooth shell of the scale is described.

WALKER (G. P.). **The Use of White Arsenic as an Insecticide in Bordeaux Mixture on the Potato in New Brunswick.**—*Proc. Acadian Ent Soc. 1921*, no. 7, pp. 42–44. Truro, N.S., June 1922. [Received 19th December 1922.]

Experiments having proved conclusively the value of white arsenic as an insecticide and the safety of its use on potato foliage [*R.A.E.*, A, viii, 150], it was thought advisable to prepare the material for commercial use and to draw the attention of growers to its value. During 1921, a mixture of white arsenic in Bordeaux mixture has been sold and largely used under the name D.E.L. Mixture, and has given very good results.

TOTHILL (J. D.). **An Estimate of the Damage done in New Brunswick by the Spruce Budworm.**—*Proc. Acadian Ent. Soc. 1921*, no. 7, pp. 45–48. Truro, N.S., June 1922. [Received 19th December 1922.]

These statistics regarding damage in New Brunswick by the spruce budworm [*Tortrix fumiferana*, Clem.] have been noticed from another source [*R.A.E.*, A, x, 576.]

BRITTAIN (W. H.). **Further Experiments in the Control of the Cabbage Maggot** (*Chortophila brassicae*, **Bouché**) **in 1921.**—*Proc. Acadian Ent. Soc. 1921*, no. 7, pp. 49–71. Truro, N.S., June 1922. [Received 19th December 1922.]

Continuing the work of previous years [*R.A.E.*, A, x, 163, etc.], tests have been made of the efficacy of various substances as remedies

for *Phorbia* (*Chortophila*) *brassicae.* Pyridine is considered impracticable on account of its odour and the effect on those using it. Derris, contrary to experience in previous years, proved ineffective, but had probably deteriorated in storage. Anthracene oil was without much value. Tests with cresylic acid (98 per cent. pure) showed, contrary to expectation, that crude creosote is greatly superior to the pure product, even when used at the same strength. Mercury bichloride (corrosive sublimate) again gave the best results. It is readily obtainable and, when in solution, easily applied, and will destroy maggots several days old. A gallon was sufficient, under average conditions, to cover 20 plants on smooth, fairly moist soil; on dry or lumpy ground enough would have to be used to penetrate. A dust mixture composed of 1 part mercury bichloride and 99 tobacco dust, produced the largest yield.

The cost of the various treatments is compared. Their effect on the seedlings, the number and times of applications necessary, and their toxicity to the eggs and larvae at different stages, are briefly discussed, as is the possibility of growing resistant varieties, but all these points require further investigation. For the treatment of radishes, dusts are not suitable, but mercury bichloride 1 : 1000 or 1 : 1500 is quite satisfactory. On turnips, this has not given such good results, but further tests are to be made.

Many Cruciferous weeds act as food-plants for the maggots, those most heavily infested being *Raphanus raphanistrum*, *Sinapis arvensis*, *Brassica nigra* and *Sisymbrium altissimum*.

GORHAM (R. P.). **The Birch-leaf Skeletoniser abundant in New Brunswick.**—*Proc. Acadian Ent. Soc. 1921*, no. 7, p. 72. Truro, N.S., June 1922. [Received 19th December 1922.]

For the past two years, larvae of the moth, *Bucculatrix canadensisella* (birch leaf skeletoniser) have been abundant on birches in New Brunswick. Moths were noticed on the leaves from 1st to 20th July in 1921, and oviposition seemed to continue throughout this period. The eggs were laid singly on a leaf, the young larvae at once penetrating within the leaf tissue and passing the first few weeks as miners between the upper and lower epidermis.

WILKE (S.). **Der Rüsselkäfer,** *Tanymecus palliatus*, **F., ein neuer Schädiger der Zuckerrübenfelder in Deutschland.** [The Weevil, *T. palliatus*, a new Pest of Sugar-beet Fields in Germany.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, ii, no. 12, pp. 97-98. Berlin, 1st December 1922.

Tanymecus palliatus, F., is recorded as feeding on the foliage of sugar-beet in Pomerania, and in Hanover it entirely defoliated a portion of a field, from the edges inwards. This weevil does not seem to have been previously recorded as a serious pest of beet in Germany, and nothing is known of its bionomics. It is not clear why this species, which infests various plants, especially nettles and thistles, throughout Europe, should suddenly invade beet-fields. Lack of food, due to the continued drought in 1921, may have been the reason. It is possible that it may disappear equally rapidly, as a further report on the infestation in Hanover seems to indicate. In cases where no rapid decrease is noticed, trenches should be dug around the infested area. Poultry destroy this pest, which may also be checked by spraying with a 2–4 per cent. solution of barium chloride, or with arsenicals such as Urania green.

KNOCHE (E.). **Die Wipfelkrankheit der Nonnenraupen.** [The Tree-top Disease of Nun Moth Larvae.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, ii, no. 12, pp. 98–99. Berlin, 1st December 1922.

The name " tree-top disease " was originated by Ratzeburg because larvae of the nun moth [*Liparis monacha*] infected with it begin their attack by defoliating the top of the tree instead of working upward, as is usual. Some cytological observations on this polyhedral disease [*R.A.E.*, A, x, 28] are given, and the author believes that the complicated polyhedral bodies cannot be decomposition products due to Chlamydozoa.

In May–June 1922 the author observed defoliation of the tops of larches and firs near Zittau and a little later the larvae were found to be infected. The disease has since spread, but not to a marked extent.

GARRETSEN, (A. J.). **Proeven ter bestrijding van** *Helopeltis*, **met „ Nicine " genomen.** [Experiments with " Nicine " in combating *Helopeltis*.]—*De Thee*, iii, no. 1, pp. 15–20. Buitenzorg, March 1922. [Received 16th December 1922.]

A number of laboratory and field tests on the effect of " Nicine " on *Helopeltis* on tea is described. This preparation is a powder composed chiefly of calcium creosolate with an excess of lime. It is very slightly soluble, 10 lb. per gallon of water being needed to yield a 1 per cent. solution. In this form it proved to be neither a contact insecticide nor a repellent, and it also appears to confer a peculiar flavour to the dried leaf made from foliage sprayed with it.

BERNARD (C.). **Twee soorten van „ bunch caterpillars "** *Andraca* **en** *Bombysatur*. [Two kinds of Bunch Caterpillars, *Andraca* and *Bombisatur*.]—*De Thee*, iii, no. 1, pp. 20–21, 1 plate. Buitenzorg, March 1922. [Received 16th December 1922.]

Following a previous note on bunch caterpillars from Java and Sumatra, a plate is given illustrating some of the differences between the Javanese *Andraca bipunctata* and the Sumatran *A. apodecta*, Swinh. (*Bombisatur corporaali*) [*R.A.E.*, A, x, 175].

BERNARD (C.) & GARRETSEN (A. J.). **Een ernstige rupsenplaag in de kina.** [A serious Infestation of Cinchona by Lepidopterous Larvae.]—*De Thee*, iii, no. 1, p. 21, 2 plates. Buitenzorg, March 1922. [Received 16th December 1922.]

A very severe infestation of cinchona by *Attacus ricinus* occurred in one district, the trees being entirely defoliated. Up to the time of writing tea had not been attacked, though *A. atlas* has been known to attack this crop. Much of the material collected was found to be parasitised. The capture of the adults and collection of the eggs, larvae and cocoons may, however, be carried out, care being taken to afford parasites an opportunity of escaping.

MENZEL (R.). **Vogels als natuurlijke vijanden van schadelijke insecten.** [Birds as natural Enemies of Injurious Insects.]—*De Thee*, iii, no. 2, pp. 50–52. Buitenzorg, June 1922. [Received 16th December 1922.]

Consequent on a report that swarms of a mynah, *Acridotheres javanicus*, were eating the pupae out of the cocoons of *Setora nitens* on

a tea estate, the attention of planters is drawn to the value of birds in destroying insects. In the case in question the moth continued to increase, but it is evident that some service was done.

MENZEL (R.). **Spinneweb-achtige nesten van houtluizen op theeboomen.** [Spider-web-like Nests of Psocids on Tea Bushes.]—*De Thee*, iii, no. 2, June 1922, pp. 54–55, 1 plate. Buitenzorg, June 1922. [Received 16th December 1922.]

In a recent infestation in Sumatra the branches of tea plants were entirely wrapped in the webs of *Archipsocus recens*, Enderl. Though no injury ensued, it is possible that the presence of such masses of webs may prove harmful.

MENZEL (R.). **Blaaspooten als theebladrollers.** [Thrips as Tea Leaf-rollers.]—*Dee Thee*, iii, no. 2, pp. 55–57, 2 plates. Buitenzorg, June 1922. [Received 16th December 1922.]

The infestation of tea by *Anaphothrips theiperdus*, *A. theivorus* and *A. theifolii*, already noticed [*R.A.E.*, A, x, 272], proved to be a very severe one; but it occurred in a neglected tea plantation, overgrown with weeds and surrounded by forest. The thrips had probably migrated from the latter. While a record of the case and further information on the subject are desirable, there is no cause for anxiety.

COHEN STUART (C. P.). **Bladrollers op Poespa.** [Leaf-rollers on *Schima noronhae*.]—*De Thee*, iii, no. 2, pp. 57–58. Buitenzorg, June 1922. [Received 16th December 1922.]

In his monograph on the leaf-rollers of tea, Leefmans included *Schima noronhae* among the wild food-plants of *Cydia* (*Laspeyresia*) *leucostoma*, Meyr., and *Gracilaria theivora*, Wlsm. [*R.A.E.*, A, x, 282], on the authority of the author, who now finds that the plant was wrongly identified, the correct food-plant being wild tea, *Camellia lanceolata*.

KEUCHENIUS (A.). *Deguelia microphylla* (*Derris microphylla*) **als schaduwboom en groenbemester in theetuinen.** [*D. microphylla* as a Shade-tree and Green Manure on Tea Estates.]—*De Thee*, iii, no. 3, pp. 74–78, 2 plates. Buitenzorg, September 1922.

Among the many advantages of *Deguelia* (*Derris*) *microphylla* as a shade-tree and green manure for tea is its freedom from infestation by borers and *Helopeltis*.

ROEPKE (W.). **De kwestie van** *Andraca's* **(„Bunch Caterpillars")** **opgelost.** [The Question of the "Bunch Caterpillars" solved.]—*De Thee*, iii, no. 3, pp. 82–85. Buitenzorg, September 1922.

It is now established that the bunch caterpillar occurring in Sumatra is *Andraca apodecta*, Swinhoe [*R.A.E.*, A, x, 175], while *A. bipunctata*, Wlk., occurs in Java and Assam. The author agrees with van Eecke in treating these moths as Notodontids. *Schima noronhae* is one of the wild food-plants of *A. bipunctata*.

Bernard (C.)] & Prins (—). **De vijanden van verschillende rupsen.** [The Enemies of various Lepidopterous Larvae.]—*De Thee*, iii, no. 3, pp. 87-90, 1 plate. Buitenzorg, September 1922.

On a tea estate in Central Java several serious outbreaks of *Andraca bipunctata*, Wlk., have occurred. From the collected material thousands of Dipterous parasites were bred. In 1922 a recurrence of the infestation was expected in April and May, but up to the end of May no larvae were seen.

In the course of an outbreak of *Setora nitens* on another estate in 1921, from January 1922 onwards the infestation began to decrease rapidly. Plots in which the tea plants were weak were preferably attacked and—as in the case of *Helopeltis*—the larvae were very scarce on those parts of the bushes that were over about 5 ft. from the ground. Tea from which *S. nitens* has disappeared is very susceptible to *Helopeltis*, contrary to what was observed on the same estate after an infestation in 1918 by *Stauropus alternus*, when for about two years no attack by *Helopeltis* took place.

Bernard (C.). **Insecten in de theetuinen op Sumatra.** [Insects in Tea Estates in Sumatra.]—*De Thee*, iii, no. 3, pp. 91-99, 3 plates. Buitenzorg, September 1922.

Microserica pulchella is a small Melolonthid that feeds on the leaves of tea, usually leaving the mid-ribs only. The shoots are severely injured, but old leaves are untouched. When the young leaves have been eaten the beetles attack the bast of the twigs, which wither above the place injured. *Deguelia microphylla* grown among infested tea was not attacked. The beetles had probably migrated from wild food-plants. The collection of the adults, which are easy to catch between 11 a.m. and noon, is advised.

Further observations made on the estate infested by the Chrysomelid, *Phytorus dilatatus*, Jac. [*R.A.E.*, A, x, 176], showed that the attack had decreased very considerably. At intervals of two or three months a new generation appears, and the number of individuals increases enormously. A bunch caterpillar, *Andraca apodecta*, Swinh., and *Megachile* sp. also occurred, but disappeared after pruning.

A severe infestation by Psychids, probably *Acanthopsyche subteralbata*, Hmps., was observed to be connected with the presence of *Albizzia moluccana*. In the author's opinion, however, this Leguminous tree is not at all dangerous to tea, provided that it is properly watched and treated. Only one stem of each tree should be left standing, and this stem should be pollarded at about 16 ft. and thoroughly pruned. When new branches grow they should be cut off, all except four or five at the top. This enables the advantages of Leguminosae as shade and green manure to be obtained, while if the trees are attacked by insect pests the latter can be combated without difficulty.

On a previous occasion the author had observed *Acanthopsyche subteralbata* with a bag of spindle shape on *Albizzia moluccana*. A bagworm on tea with a cone-shaped bag on the lower surface of the leaves is now found to be the same species. The explanation may be that the cone-shaped bag is identified with the stage of larval activity, while the spindle-shaped one occurs when the larva is pupating, being in fact a kind of cocoon.

Besides *A. subteralbata* some specimens of *A. snelleni* were observed in the infestation described, and also *Setora* sp., *Biston suppressaria* and *Hypochnus* sp.

WILBRINK (G.). **Een onderzoek naar de Verbreiding der gelestrepen-ziekte door bladluizen.** [An Investigation on the Spread of the Mosaic Disease of Sugar-cane by Aphids.]—*Meded. Proefst. Java Suikerind.*, 1922, no. 10, pp. 413-456. Pasoeroean, 1922.

On the publication of the paper by Brandes [*R.A.E.*, A, viii, 370] the author examined the occurrence of the maize aphis, *Aphis maidis*, Fitch (*adusta*, Zehnt.) and of the closely-allied sorghum aphis, *A. sacchari*, Zehnt., in or near sugar-cane fields. Contrary to what occurs with the former species, *A. sacchari* (which is far more common on cane) is easily bred on any cane plant. It prefers cane growing in shade, and increases more rapidly in the wet season than in the dry one. In some districts of Java maize, sorghum and *Setaria italica*—all favourite food-plants of *A. maidis*—are cultivated near cane. None of the weed food-plants of *A. maidis* are rare near cane-fields, and *Cynodon dactylon*, *Paspalum sanguinale* and *Panicum colonum* are commonly infested, especially the last-named. On all the food-plants there was an alternation of generations of apterous and alate parthenogenetic females only; no sexual generation was noticed. *A. maidis* was thus found on a number of plants. The normal yellow *A. sacchari* occurs only on sugar-cane and sorghum. There is a rose-coloured form of this species, but it occurs only on sorghum and *Panicum colonum*, and is not therefore concerned in the transmission of cane mosaic.

A transference of *A. maidis* was easily effected by growing cane in the immediate proximity of its food-plants. A repeated infection with mosaic was noticed in these plants if they grew near diseased cane. They were not infected if growing near healthy cane. Other experiments showed that it is very improbable that *A. sacchari* conveys mosaic in Java. The infection can be carried by *A. maidis* from cane to cane and from cane to grass. These results confirm the work done by Brandes, and complete it by proving that mosaic in Java is infectious and is transmissible by *A. maidis*. Though the infestation of sugar-cane by *A. maidis* is not very common, its frequent occurrence on grasses in cane-fields permits the spread of the disease. As regards control, the selection of healthy cane for planting is essential. As *A. maidis* increases on grasses rather than on cane, it is advisable to clear the former away from the young cane plants and from ditches, etc. The grasses should be removed immediately to a distance and there buried or burned. A methodical application of these measures should render the occurrence of mosaic disease very unlikely.

BONDAR (G.). **As lendas e a verdade sobre a formiga Caçarema da Bahia e seu papel na lavoura.** [Legends and Truth on the Ant, *Azteca chartifex*, and its Rôle in Agriculture.]—*Chacaras e Quintaes*, xxvi, no. 5, pp. 369-371, 1 fig. S. Paulo, 15th November 1922.

While admitting that the ant, *Azteca chartifex*, may prevent the development of the cacao thrips, *Heliothrips rubrocinctus*, Giard, in cacao plantations, the author points out that the thrips is an occasional pest that sometimes fails to appear, whereas the scale-insects protected by the ant are a standing evil that defies treatment in practice. It is therefore advisable to destroy the ant instead of encouraging it.

"**Tanglefoot" para as formigas.** [Tanglefoot for Use against Ants.] *Chacaras e Quintaes*, xxvi, no. 5, p. 400. S. Paulo, 15th November 1922.

The following formulae may be used for banding trees to prevent infestation by ants:—(1) Dissolve 2 oz. Burgundy pitch in a bain-marie, add ½ oz. of "ordinary" oil, wash the mixture with cold water, replace on the fire and add 1 oz. of honey; (2) pitch, 4 parts, linseed oil 1, molasses 1, to be boiled together.

REYNE (A.). **Verslag van den Entomoloog.** [Entomologist's Report.] —*Verslag Dept. Landbouw in Suriname 1921*, pp. 19–24. Paramaribo, 1922.

The results obtained regarding the cacao thrips [*Heliothrips rubrocinctus*] have been already published [*R.A.E.*, A, x, 279]. In the case of young cacao trees, painting the stems with 2 per cent. lead arsenate protected them against the adults of *Stirastoma*. An investigation is being made as to the value of lime and lead arsenate against the green scale of coffee, *Coccus* (*Lecanium*) *viridis*. Spraying with a 7 per cent. solution of fruit-tree carbolineum killed the scales, but three months later the trees were reinfested. Nearly all the trees contained nests of *Cremastogaster*, and the clearing up of these nests is quite as necessary as spraying. Trees that were banded and thus protected against ants were free from scales in two months, but became reinfested on the ants being permitted to return. *Dolichoderus bidens* may be combated with carbolineum emulsion, and planters state that a 1½ per cent. solution of fruit-tree carbolineum is effective. *Theridium* sp. caused some trouble in places by covering the coffee bushes with webs. A rice-field and *Paspalum virgatum* growing near by were infested with bugs, *Mormidea ypsilon*. Young coconut palms were attacked by borers, *Castnia*, in spite of every care. Sweet potatoes were infested by a weevil, *Euscepes* (*Cryptorrhynchus*) *batatae*.

RITZEMA BOS (J.). **De merel en hare oeconomische beteekenis.** [Blackbirds and their Economic Importance.]—*Tijdschr. Plantenziekten*, xxviii, no. 2, pp. 17–29. Wageningen, February 1922. [Received 20th December 1922.]

The blackbird destroys large numbers of plant pests, including insects such as Coleopterous larvae, Tipulid larvae and those of *Bibio hortulanus*.

RITZEMA BOS (J.). **Het stengelaaltje** (*Tylenchus devastatrix*, **Kühn**). [The Nematode, *T. devastatrix*.]—*Tijdschr. Plantenziekten*, xxviii, no. 11, pp. 159–180, 1 plate. Wageningen, November 1922.

In this address to the Dutch Phytopathological Association, on 27th May 1922, after notes on some points of the life-history of Nematodes in general, an account is given of the habits of the stem eelworm, *Tylenchus devastatrix*, Kühn. A long list of the plants infested by this species is followed by a description of the injuries inflicted. Preventive measures include the cleaning of agricultural implements that have been used on infested ground and the hoofs of horses and shoes of men coming from such ground. Stable manure is likely to harbour Nematodes and their eggs. Infested land should be treated with manures rich in nitrogen in order to stimulate the growth of the plants,

which are thus exposed to attack for a shorter time when still young. On land that is strongly infested it is better to grow summer rye than winter rye. Such varieties of rye as develop very quickly at first suffer less than others. The ground must be well worked and manured, and this crop must be changed now and then for barley, kohl-rabi, or potatoes.

PHAM-TU-THIÊN. **Un insecte nuisible aux feuilles de vanilliers en Cochinchine** (*Spilarctia multiguttata*, **Wlkr.**).—*Bull. Econ. Indochine*, xxv, no. 155, pp. 438–441, 2 plates. Hanoi-Haiphong, July–August 1922.

Two larvae that were taken from badly eaten leaves of vanilla were reared to maturity and proved to be those of *Spilarctia multiguttata*, Wlk. Failing a supply of vanilla leaves, they were reared on those of *Pothos scandens*. The adults emerged 13 or 14 days after pupation in a cocoon. This moth seems to be a serious pest of vanilla. The spray recommended is composed of 6 lb. lead arsenate with 4 gals. flour paste, to 100 gals. water. As the young caterpillars are far less resistant than older ones, this treatment should be begun as soon as the first larvae have hatched.

Defoliation of Oak.—*Forestry Commiss.*, Leaflet no. 10, 3 pp., 1 fig. London, October 1922.

The life-history of *Tortrix viridana*, L. (green tortrix) has already been noted [*R.A.E.*, A, iv, 338]. In severe outbreaks the larvae may cause complete defoliation at midsummer, the pedunculate oaks suffering much more than the sessile ones. Sweet chestnut and evergreen oak occasionally suffer, and other trees growing in the immediate vicinity may also be attacked. Owing to the capacity of the trees to produce a second crop of leaves after midsummer, the actual damage caused is only loss of increment and reduction in the number of acorns produced. Effects are more severe in cases of drought or fungus attack, especially where oak mildew (*Oidium*) is troublesome. The cost of spraying with lead arsenate or lead chromate is prohibitive, and the result uncertain. The best means of protection is the encouragement of insectivorous birds. The caterpillars are also preyed upon by ants, earwigs, beetles (*Silpha* spp.), Empid flies and the larvae of a moth, *Cosmia trapezina*, and are parasitised by Hymenoptera (*Meteorus* sp.) and at least one species of Tachinid.

MURPHY (P. A.). **Leaf-roll and Mosaic, two important Diseases of the Potato.**—*Jl. Dept. Agric. & Tech. Instr. Ireland*, xxii, no. 3, pp. 281–284, 2 figs. Dublin, November 1922.

Aphids were the first recorded carriers of leaf-roll and mosaic disease of potatoes, but they are not the only or principal insects concerned in Ireland, as Capsids and Jassids have now been proved responsible for the spread of the diseases from plant to plant. It has been found that Aphids are also capable of carrying infection, in the case of leaf-roll at least, from the sprouts of a diseased tuber to neighbouring healthy ones. The presence of Aphids or diseased tubers in a house in which potatoes are sprouted is probably a serious matter. Control measures aimed directly at the insect carriers are impracticable, but enclosed or shady places should be avoided for the crop, and weeds, including those in hedges and ditches, should be destroyed.

Codlin Moth Experiments.—*Jl. Dept. Agric. Victoria*, xx, pt. 10, pp. 583–589. Melbourne, October 1922.

Spraying experiments against codling moth [*Cydia pomonella*] in 1920–21 are described. The results prove that no spray can be omitted without loss of fruit from codling moth attack, and that the calyx and February sprays are the most important. The necessity of spraying a short time before the insect enters the apple is emphasised. Generally speaking, no advantage was obtained by increasing the strength of the spray. The stronger solution (6 and 7 lb. lead arsenate to 100 gals.) was slightly more effective when applied in the last sprays of the season, while the weaker (4 and 5 lb. lead arsenate) was preferable in the earlier sprays.

Ramsay (J. T.). **The Control of the Grub of the Potato Moth.**—*Jl. Dept. Agric. Victoria*, xx, pt. 10, pp. 590–594, 2 plates. Melbourne, October 1922.

Many efforts have been made to control the damage caused to potato tubers by *Phthorimaea operculella*, Z. (*Lita solanella*, Boisd.) in Australia. Up to the present season cultivation has proved the only successful measure. Spraying is too expensive, and storage in moth-proof chambers and fumigation are impracticable.

Keeping the soil well tilled so that a fine mulch can be moulded over the tubers prevents the larvae from gaining access to them. Loose sandy soils give the best protection, as loamy or clayey soils are liable to become baked and cracked. Unfortunately, when harvesting is begun, the adults oviposit in the exposed tubers and the bags, which cannot be removed quickly enough to prevent this. A description is given of tests with an emulsified oil compound known as Tuberol. Clean tubers immersed in a 1 in 30 solution of Tuberol for 15 hours were well sprouted and healthy, while five minutes' immersion prevented any damage by larvae. Of untreated tubers under the same conditions, 100 per cent. were affected. No opinion can yet be given as to whether the cooking, flavour or quality is affected. It is estimated that 1 gal. makes sufficient dip to treat two tons of potatoes.

Waters (R.). **Fireblight. Incidence of the Disease in New Zealand.**—*N.Z. Jl. Agric.*, xxiv, no. 6, pp. 350–357; xxv, no. 4, pp. 209–214; 9 figs. Wellington, N.Z., June and October 1922.

The history and nature of fireblight (*Bacillus amylovorus*) are recorded. It has been found in New Zealand on pear, hawthorn, apple and quince, and has been definitely proved to cause serious injury to the medlar, a host not thought to have been previously recorded in any part of the world. It has not yet been found on any stone fruit in New Zealand. In 1921 a Flatid bug, *Sephena cinerea*, Kirk., was found to be capable of transmitting the disease. Long-distance transmission by birds, insects and man is discussed. The latter is the chief distributor, and the importance of the regulations to prevent infected material being transferred from one place to another is emphasised.

Treatment within the affected areas and the danger of hawthorn to orchardists are briefly described. The only satisfactory measure is the complete removal of all diseased portions of the affected tree. As each new season's outbreak is due to the ooze that arises from hold-over cankers being carried by insects or other agencies to the blossoms

of suitable host-plants, the cutting-out of infections should be completed well before the blossoming period. All infected shoots, laterals, etc., should be cut back into undoubtedly healthy wood. In cases of complete removal of larger branches, which has frequently to be adopted owing to the rapid development of the disease, particularly in early summer, the final cut should be made at least 1 ft. below the apparent infection. In circumstances less favourable to the disease the larger limbs may be saved by operating on the diseased area alone. A more or less circular cut should be made round the margin of the canker and the diseased and healthy bark within removed, and the wood scraped clean and thoroughly disinfected with a 5 per cent. solution of formalin or lysol, or equal parts of cyanide of mercury and bichloride of mercury to 1,000 parts water. The wound should then be painted with a mixture of creosote and tar or white-lead paint, preferably the former. Care should be taken to prevent the spread of the disease by careless use of infected tools.

WOODWORTH (H. E.). **The Philippine Cotton Boll Weevil.**—*Philippine Agric.*, xi, no. 3, pp. 75–81, 1 plate. Los Baños, October 1922.

A cotton boll-weevil, *Amorphoidea lata*, Motch., is widely distributed in the Philippines, where it is the most important pest of cotton, the bolls attacked by the larvae falling to the ground without producing mature seeds or fibre. The various stages are described. The life-cycle occupies 11 or 12 days, breeding being continuous throughout the year if food is available. The eggs are laid in the tissue of the opened flower, in the sheath of the ovary or staminal column, several being sometimes deposited in one flower. The larvae, immediately upon hatching, eat their way into the ovary, of which they generally destroy the whole contents before pupation, which takes place after about six days in the soil just below the surface. Adults emerge about four days later. Although the larval stage is the most injurious, as it results in the complete destruction of the bolls, the adults also cause damage by feeding on the flower parts, causing the flowers to drop. The food-plants of the larvae include all varieties of cultivated cotton, as well as *Thespesia lampas*. Adults feed on flowers of other Malvaceae as well as on the larval food-plants.

There is little danger of the weevil being introduced into other countries, except possibly in raw cotton, packages of seeds, plants, or soil.

FEYTAUD (J.). **Le Doryphora de la Pomme de Terre en Gironde.**—*Rev. hortic. Algérie*, xxvi, no. 9, pp. 163–165. Algiers, November 1922.

An account is given of the appearance of *Leptinotarsa decemlineata*, Say (potato beetle) in France and of the measures inaugurated to combat its spread [*R.A.E.*, A, x, 575, etc.].

SECRETAIN (C.). **Notes séricicoles.**—*Ann. École Nat. Agric. de Montpellier*, xvii, no. 3, pp. 191–226. Montpellier, 1922.

Experiments are described in which silkworms were reared on other food than mulberry leaves, with a view to determining the effect of the change on their liability to disease. In all the tests made a greater susceptibility to disease resulted, except in the case of *Cudrania triloba*. Both *Scorzonera hispanica* and *Maclura aurantiaca*, when used as food-plants, predisposed the silkworms to attacks of grasserie.

HEGH (E.). **Les Termites.**—*Bull. agric. Congo belge*, xiii, no. 2, pp. 363–459, 52 figs. Brussels, June 1922. [Received 27th December 1922.]

This instalment of the monograph on African termites includes an appendix to Chapter II, previously noticed [*R.A.E.*, A, ix, 521], a further description of the nests [*R.A.E.*, A, x, 425], and other sections that have already been reviewed from a different publication [*R.A.E.* A, x, 570].

DE ONG (E. R.) & ROADHOUSE (C. L.). **Cheese Pests and their Control.** —*California Agric. Expt. Sta.*, Bull. 343, pp. 399–424, 9 figs., 1 table. Berkeley, Cal., May 1922. [Received 27th December 1922.]

Cheese skippers and mites attack cheese in almost every part of the world, and are widely distributed in the United States. A brief account is given of the bionomics of the species dealt with, *Piophila casei*, L., *Tyroglyphus siro*, Gerv., *T. lintneri*, Osb., *T. farinae*, DeG., *T. longior*, Gerv., *T. terminalis*, Banks, *Carpoglyphus anonymus*, Haller, and *Necrobia rufipes*, DeG.

Dirty storage rooms, greasy shelves, old cheese with broken paraffin covering, a humid atmosphere and warm temperatures favour the development of these pests. Slow curing of cheese at temperatures of 30°–36° F., and even up to 50° F., prevents loss through either skippers or mites. Paraffining cheese is a protection against infestation if the coating is kept intact. The screening of cheese-curing rooms and thorough cleanliness in them and in factory rooms are recommended. The most efficient remedial measure is fumigation with hydrocyanic acid gas, carbon bisulphide, or burning sulphur. The last is the safest but the least effective, and careful precautions should be taken in using the first two. General directions for fumigation are given. It should be done, if possible, at a temperature of 70° F. Two careful fumigations of the right dosage correctly timed, followed by thorough cleaning, should destroy all stages of the pest as they become susceptible. The amount of sodium cyanide required for a well-built room is 1½ oz. per 100 cu. ft., the chemicals being used in the following proportions :—1½ lb. sodium cyanide, 2¼ U.S. pts. sulphuric acid, and 3 U.S. pts. water. The amount of carbon bisulphide used varies from 10 to 30 lb. (1 U.S. pt. of the liquid weighs about 1·3 lb.) per 1,000 cu. ft., according to the impermeability of the room. Sulphur will probably kill the mites and the adults of *P. casei*, but cannot be depended upon to kill the skipper or the pupal stages of the latter. After fumigation, the rooms should be thoroughly cleaned and all aged cheese disposed of. The entire stock of cheese should be untouched while the room is being fumigated, so as to prevent the scattering of infestation. The fumigating gases did not affect the taste or smell of the cheese. Any odour apparent disappeared after a short aeration.

Bulb Item Revised. Quarantine 37.— *U.S. Dept. Agric. Fed. Hortic. Bd.* 2 pp., multigraph. Washington, D.C., 18th December 1922.

This amendment No. 2 to Regulations Supplemental to Notice of Quarantine No. 37 (revised) came into effect on and after 1st January 1923. Various kinds of nursery stock, including roses, other plants, bulbs and seeds, are specified, and may be imported from countries that maintain inspection under permit in compliance with these

regulations. Importations from countries not maintaining inspection may be made in limited quantities for experimental purposes only except in the case of tree seeds.

GOUGH (L. H.). **On the Dispersion of the Pink Boll Worm in Egypt.** —*Minist. Agric. Egypt, Tech. & Sci. Service,* Bull. 24, 21 pp. Cairo, 1922.

This is a study of the mode of distribution of the pink bollworm [*Platyedra gossypiella*, Saund.] in individual cotton bolls in Egypt. In it there are various newly discovered factors to be taken into consideration. The moths, for example, show a certain selection in oviposition, and do not choose the flower buds unless there is a shortage of suitable green bolls. The eggs are not always laid singly, but are frequently found in batches, though the mortality among the hatching larvae seems to eliminate irregularities arising from this source. There is also the time element. Infestation only takes place during the growing period of the boll (50 days), and during this period the abundance of moths, and with them the chances of infestation, are increasing, while the supply of bolls is varying. As maturing bolls are exposed to attack each night, it is obvious that bolls just set, and consequently exposed for one or two nights only, must be much less attacked than older groups, and that there will be a proportion of sound ones as long as boll production is proceeding.

The author's conclusions, reached from his observations and calculations, are that the distribution of the attack in cotton bolls follows definite rules in Sakellarides cotton. For any given percentage of attack it is possible to calculate the numbers of bolls per hundred with 0, 1, 2, 3, 4 and more worms. The damage is directly proportionate to the number of worms that have attacked the bolls. The damage done by a single worm is about one-tenth of the yield of the boll in Sakellarides cotton. When the percentage of attack is known, it is possible to predict the number of bolls per hundred attacked in 0, 1, 2 or 3 locks, whereby there is evidence that about one worm in four does damage to more than one lock in Sakellarides cotton. It is obvious from the study of the facts brought forward that it is not permissible to make averages of percentages of attack on bolls; if averages are required, they must be made after converting the figures for percentage attack into numbers of worms per hundred bolls or into percentage damage done.

In an addendum some figures are given comparing loss of crops in Mexico and Egypt.

AULLÓ Y COSTILLA (M.). **La puesta del** *Tortrix viridana*, **L.** [The Oviposition of *T. viridana*.]—Reprint from *Bol. R. Soc. Española Hist. Nat.*, xxi, pp. 272–274, 1 fig., Madrid, 1921. [Received 27th December 1922.]

The habits of *Tortrix viridana*, L., have been observed in the oak woods of Villanueva de Córdoba, where *Malacosoma neustria*, L., and *Porthetria (Lymantria) dispar*, L., are also recorded pests. Oviposition occurs in June in the first warm hours of the morning. From one to four eggs are laid, at a point on the twig where a new shoot will bud, so that the newly-hatched larva is enveloped by the bud that is to be its food.

SACHTLEBEN (H.) & PAPE (H.). **Krankheiten und Beschädigungen der Kulturpflanzen im Jahre 1920.** [Diseases and Injuries of Cultivated Plants in 1920.]—*Mitt. Biol. Reichsanst. Land- u. Forstw.*, no. 23, pp. 26–101, 6 maps. Berlin, August 1922. [Received 18th December 1922.]

Dr. Sachtleben is responsible for the sections on insect and other animal pests in this report. The injurious insects are divided according to the class of plants infested, and the record is a very complete one, only a few being mentioned here.

Pests of cereals.—Nematodes, *Tylenchus dipsaci*, Kühn, occurred in various parts of Germany. In Oldenburg the crop that suffered most was rye, both in places where rye had been grown constantly and following potatoes on land where no rye had been planted before. *Oscinella* (*Oscinis*) *frit*, L., and *O. pusilla*, Mg., were not generally abundant. *Chlorops taeniopus*, Mg., was numerous in Bavaria, East Prussia and Silesia. *Hylemyia coarctata*, Fall., did considerable damage in Prussia and Würtemberg. The Hessian fly, *Mayetiola destructor*, Say, only occurred in Brandenburg as a pest of rye.

Pests of root crops.—The infestation of potatoes in Mecklenburg by the beet Nematode, *Heterodera schachtii*, Schmidt, is steadily spreading. The caterpillars of *Gortyna* (*Hydroecia*) *micacea*, Esp., injured this crop at Lübeck. Potatoes were also attacked by bugs, *Lygus pabulinus*, L., and *L. pratensis*, L. Beet was seriously injured by beetles, *Blitophaga opaca*, L., and *B. undata*, Müll. The beet bug, *Piesma capitata*, Wolff, did severe local injury in Silesia and has spread in Anhalt.

Pests of fodder plants.—*Tylenchus dipsaci*, Kühn, occurred as a pest of clover. A millipede, *Julus* sp., attacked maize, and an infestation of lucerne by *J. sabulosus*, L., was reported.

Pests of vegetables.—Lepidoptera included *Depressaria applana*, F., defoliating carrots; *Cydia* (*Grapholita*) sp., which was a serious pest of peas in Prussia; *Phalonia* (*Conchylis*) *epilinana*, Z., which in one locality damaged flax very severely, and *Pieris brassicae*, L., which was a serious and widespread cabbage pest in Prussia. Dipterous pests included *Anthomyia radicum*, Mg., and *Phorbia* (*Chortophila*) *brassicae*, Bch., injuring cauliflower; *Pegomyia hyoscyami*, seriously infesting spinach, three generations of this fly occurring in some places; and the onion fly, *Hylemyia antiqua*, Mg. Coleoptera included the rape beetle, *Meligethes aeneus*, F.; flea-beetles, mostly *Phyllotreta* sp., on turnips and cabbage; *Psylliodes chrysocephala*, L., on rape; *Bruchus atomarius*, L., injurious to beans; *Sitona* spp. on peas, beans and lentils; and *Ceuthorrhynchus* spp., including *C. sulcicollis*, Gyll., and *C. assimilis*, Payk., which occurred in most parts of Germany, especially on rape.

Fruit pests included the mites *Eriophyes pyri*, Pagst., on pear leaves, and *E. tristriatus*, Nal., on walnut foliage. *Lyonetia clerkella*, L., and *Coleophora* sp. infested cherry. *Hyponomeuta* sp. did considerable damage to stone-fruit in some districts on the Rhine. *Cydia* (*Carpocapsa*) *pomonella*, L., occurred in various parts of Germany on apples and pears, and in some districts in East Prussia about 80 per cent. of the crop was lost. *Malacosoma neustria*, L., and *Nygmia phaeorrhoea*, Don. (*Euproctis chrysorrhoea*, L.) infested cherry, plum, apple and pear. The apple blossom weevil, *Anthonomus pomorum*, L., occurred in many parts of the country, but only in a

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few cases in abundance. The Scolytids, *Scolytus* (*Eccoptogaster*) *rugulosus*, Ratz., injured plum, and *Xyleborus dispar*, F., all stone-fruit in Hesse. The plum sawfly, *Hoplocampa fulvicornis*, Klg., was reported from several localities. The existing infestation of plum in Hesse by the red scale, *Epidiaspis betulae*, Ldgr., increased to a remarkable extent. *Bryobia praetiosa*, Koch, *Zophodia convolutella*, Hb., *Abraxas grossulariata*, L., and *Pteronus* (*Nematus*) *ribesii*, Scop., infested gooseberries, and *Anthonomus rubi*, Hbst,. strawberries and raspberries.

The vine-moth, *Clysia* (*Conchylis*) *ambiguella*, Hb., was less abundant than the infestation in 1919 had rendered probable. *Polychrosis botrana*, Schiff., and *Eriophyes vitis*, Land., occurred throughout the Rhine province. Other vine pests were *Byctiscus betulae*, L., *Eulecanium* (*Lecanium*) *corni*, Bch., and *Pulvinaria betulae*, Sign. The latter scale was combated by scraping and by spraying with a 10–15 per cent. solution of carbolineum and lime.

Forest pests were *Tortrix viridana*, L., *Panolis flammea*, Schiff. (*griseovariegata*, Goeze), which spread from its previous centre in Baden, several hundred acres being defoliated ; *Dendrolimus pini*, L. ; *Liparis* (*Lymantria*) *monacha*, L. ; *Hylobius abietis*, L., which occurred in some abundance in Brunswick, though energetic measures limited the injury, 688,000 beetles being collected ; and *Pissodes pini*, L., which attacked 30–35 year old Weymouth pine in Brunswick. The sawfly, *Lygaeonematus pini*, Retz., occurred again near Cologne. As compared with 1919 a decrease of infestation by one-third was noticed in the Naunhofer forest, Saxony. This infestation is an important one, and has been favoured by the drying of the ground since the construction of the Leipsic waterworks. *Picea excelsa*, *P. pungens*, *P. sitchensis* and *P. engelmanni* all suffered, but *P. alba* remained untouched. Spraying with Paris green gave good results against this sawfly. The pine sawfly, *Lophyrus rufus*, Latr., injured 20–30 year old trees in Brunswick, but was checked by crushing the larvae *in situ*, or by cutting off the infested branch tips. *Lyda* sp. attacked pines in Brandenburg, where the beech scale, *Cryptococcus fagi*, Bärensp., was also observed. *Lachnus fagi*, L., occurred on beeches in Brunswick.

EXT (—). **Die Rübenblattwanze.** [The Beet Leaf Bug.]—*Biol. Reichsanst. Land- u. Forstw., Berlin* [leaflet], 1 p., 1 fig. [n. d.].

The beet leaf bug, *Piesma capitata*, Wolff, has been a serious pest of sugar and fodder beet for some years in Anhalt [*R.A.E.*, A, x, 504] ; in some cases the fields had to be ploughed up in consequence of it. Continuous rain in May and June is unfavourable to the young larvae, whereas the adults suffer little from rain that occurs later in the year.

AULLÓ Y COSTILLA (M.). **Comisión de la Fauna Forestal Española. Reseñas de los trabajos verificados durante los años 1914-1916.** [Spanish Forest Fauna Committee. Summary of the Work done from 1914 to 1916.] 2nd. edn., 93 pp., 16 plates. Madrid, 1919. [Received 27th December 1922.]

This publication constitutes a useful record of forest pests observed in Spain by the Spanish Forest Fauna Committee, which was established in 1913. The reports for 1915 and 1916 have been noticed from another source [*R.A.E.*, A, vii, 89, 209].

Aulló y Costilla (M.). **Lepidópteros dañosos a los pinares.** [Lepidoptera injurious to Pines.]—*Laboratorio Fauna Forestal Española*, 1 sheet with separate map and coloured plate. Madrid, n. d. Received 27th December 1922.]

The text serves simply to supplement the coloured plate giving the forester a ready means of recognising any of the following injurious Lepidoptera occurring in Spanish forests: *Bupalus piniarius*, L., *Panolis flammea*, Schiff. (*griscovariegata*, Goeze), *Dendrolimus pini*, L., *Liparis* (*Lymantria*) *monacha*, L., *Hyloicus pinastri*, L., *Cnethocampa* (*Thaumetopoea*) *pityocampa*, Schiff., *Rhyacionia* (*Evetria*) *buoliana*, Schiff., *R.* (*E.*) *duplana*, Hb., *R.* (*E.*) *resinella*, L., *Cydia* (*Grapholita*) *strobilella*, Hbn., *Dioryctria mendacella*, Stgr., *D. pineae*, Stgr., and *D. splendidella*, Ratz.

Breuer (O.). **Die Bekämpfung des Apfelwicklers mit Bleiarseniat.** Combating *Cydia pomonella* with Lead Arsenate.]—*Schweiz. Zeitschr. Obst- u. Weinbau*, xxxi, no. 27, pp. 429–431, 1 fig. Frauenfeld, 23rd December 1922.

The following treatment is recommended against *Cydia pomonella* infesting apples in Switzerland. When two-thirds of the blossom petals have fallen a first spray is applied of the usual 3 per cent. lime-sulphur solution used against scab, etc., but to which 2 per cent. lead arsenate paste has been added. This first application aims at depositing the poison in the calyx, because 80 per cent. of the fruits are attacked in this stage by the larvae of the first generation. A second application is made two or three weeks later with the object of covering the leaves. This should suffice in most places, but in districts where a second generation occurs a third application, of lead arsenate alone, is needed, nine weeks after the fall of the blossoms. An arsenical such as Urania green is not recommended.

Müller-Thurgau (H.), Osterwalder (A.) & Jegen (G.). **Bericht der pflanzenphysiologische und pflanzenpathologische Abteilung der Schweizerischen Versuchsanstalt fur Obst-, Wein- und Gartenbau in Wädenswil für die Jahre 1917–1920.** [Report of the Department of Plant Physiology and Plant Pathology of the Swiss Experiment Institute at Wädenswill for the Years 1917–1920.] —*Landw. Jahrb. Schweiz*, xxxvi, no. 6, pp. 774–784. Bern, 1922.

During the years under review, pests of fruit trees that were received included *Lepidosaphes ulmi* (*Mytilaspis pomorum*); *Eriosoma* (*Schizoneura*) *lanigerum*; *Psylla pyrisuga*; two mites, *Eriophyes pyri* and *E. malinus*; *Eriocampoides limacina*; *Cheimatobia brumata*; and the apple blossom weevil, *Anthonomus pomorum*.

Vine pests were *Eriophyes vitis* and *Phyllocoptes vitis*; a scale, *Eulecanium* (*Lecanium*) *corni*; and the vine moths, *Clysia ambiguella* and *Polychrosis botrana*.

Garden pests included the cabbage fly, *Phorbia* (*Chortophila*) *brassicae*, which was specially abundant in 1918; *Ceuthorrhynchus sulcicollis*; and *Sitona lineata*, a pest of young peas, which may be checked by dusting with tobacco.

Paladini (F., Senior). **The Macrolepidopteron,** ***Papilio leratii*****, as a Natural Means of Controlling** ***Asclepias curassavica*****, a Weed growing in New Caledonia.**—*Rev. agricole*, no. 77, pp. 3–4. Nouméa, February 1922. (Abstract in *Internat. Rev. Sci. & Pract. Agric.*, xiii, no. 5–6, p. 773. Rome, May–June 1922.) [Received 28th December 1922.]

A weed, *Asclepias curassavica*, introduced from Tahiti about 1860, spread with extraordinary rapidity in New Caledonia, especially in the valleys. Some years later this weed had almost entirely disappeared, owing to the attacks of a butterfly, *Papilio leratii*.

Barbey (A.). **The Fir-needle Beetle (*****Polydrosus pilosus*****) in Switzerland.**—*Jl. forestier suisse*, lxxii, no. 10–11, pp. 186–189, 1 plate. Bern, 1921. (Abstract in *Internat. Rev. Sci. & Pract. Agric.*, xiii, no. 5–6, p. 778. Rome, May–June 1922.) [Received 28th December 1922.]

The weevil, *Polydrosus pilosus*, Gredl., was observed for the first time in May and June 1921 in the forests of the Canton of Vaud, on white pine [*Pinus strobus*] as well as on spruce and certain deciduous shrubs. Naturally sown seedlings of white pine, 4 in. high, were attacked, as well as trees up to 13 ft. *P. pilosus* feeds on the scarcely developed needles, those near the tip being preferred. The leaders and terminal buds seem immune, though the growth of the tree is arrested to some extent as a result of the partial stripping of the leaves.

Badoux (H.). **The Grey Pyralis of the Larch (*****Steganoptycha pinicolana*****) injurious to the Siberian Pine and the Mountain Pine in Switzerland.**—*Jl. forestier suisse*, lxxiii, no. 1, pp. 1–6, 1 plate. Bern, January 1922. (Abstract in *Internat. Rev. Sci. & Pract. Agric.*, xiii, no. 5–6, p. 779. Rome, May–June 1922.) [Received 28th December 1922.]

Since 1858 *Enarmonia diniana*, Gn. (*Steganoptycha pinicolana*, Z.) has periodically attacked larches in the plantations of Grisons and Valais. The larva feeds on the leaves in stands of all ages, arresting growth very considerably. The occurrence of the moth on other trees has generally been regarded as exceptional, and spruce and some pines have been stated to be attacked only when growing in a plantation of infested larches. Observations during the summer of 1921 have, however, shown that both the Siberian pine [*Pinus cembra*] and mountain pine [*P. pumilio*], generally regarded as vigorous and immune from insect attack, were infested by the larvae of *E. diniana*, while nearly all the larches in the same neighbourhood were free from the pest.

Badoux (H.). **Damage caused by the "White Fir Beetle" (*****Pissodes piceae*****) in Switzerland.**—*Jl. forestier suisse*, lxxiii, no. 4, pp. 68–69. Bern, April 1922. (Abstract in *Internat. Rev. Sci. & Pract. Agric.*, xiii, no. 5–6, p. 779. Rome, May–June 1922.) [Received 28th December 1922.]

Pissodes piceae, Ill., is common in Switzerland, but seldom does any appreciable damage. In 1921 this weevil appeared in a plantation of firs already greatly injured by *Chermes* (*Dreyfusia*) *nüsslini*. In another case 20 fir trees were attacked, and it was necessary to fell them. In this case *Sirex gigas*, L., was present as well. All trees harbouring the weevil should be felled and barked, and all fragments of bark in which eggs have been deposited should be burnt.

NALEPA (A.). **Zur Kenntnis der Milbengallen einiger Ahornarten und ihrer Erzeuger.** [A Contribution to the Knowledge of the Mite Galls of some Species of Maple and of their Producers.]—*Marcellia*, 19, 1922, pp. 3–33. (Abstract in *Zeitschr. Pflanzenkr. & Gallenkunde*, xxxii, no. 5–6, pp. 278–281. Stuttgart, 1922.)

The contents of this paper are sufficiently indicated by its title.

TRINCHIERI (G.). **Funghi e insetti più comuni e più dannosi alle principali specie forestali.** [The Fungi and Insects that are most common and most injurious to the principal Forest Trees.]—*Federazione pro Montibus*, Publication no. 6, 12 pp. Rome, 15th December 1921. [Received 29th December 1922.]

This small pamphlet aims at drawing attention to the chief forest pests in Italy, and to the most suitable remedies for them. *Abies* spp. are attacked by *Cryphalus piceae* and *Ips typographus*; *Pinus* spp. by *Myelophilus piniperda*, *Rhyacionia* (*Evetria*) *buoliana* and *Cnethocampa* (*Thaumetopoea*) *pityocampa*; chestnut (*Castanea sativa*) by *Malacosoma neustria* and *Cydia* (*Carpocapsa*) *splendana* var. *reaumurana*; beech (*Fagus sylvatica*) by *Nygmia phaeorrhoea* (*Euproctis chrysorrhoea*); and *Quercus* spp. by *Cnethocampa* (*Thaumetopoea*) *processionea*, *Porthetria* (*Lymantria*) *dispar*, *N. phaeorrhoea*, *M. neustria*, and *Tortrix viridana*.

TRINCHIERI (G.). **I nemici delle piante forestali. Rassegna della letteratura internazionale (1919–1920).** [The Enemies of Forest Plants. A Review of International Literature (1919–1920).]—*Federazione pro Montibus*, Publication no. 8, 30 pp. Rome, 15th January 1922. [Received 29th December 1922.]

The title of this booklet indicates its contents.

VERESHTCHAGIN (B.). **Майскій жукъ и мѣры борьбы съ нимъ.** [Cockchafers and their Control.]—**Фурника** [*Furnika*], no. 15–16, p. 14. Kishinev, 13th April 1922. [Received 24th November 1922.]

In Bessarabia the interval between outbreaks of adult cockchafers [*Melolontha*] is three years, the next being expected in 1923. A brief outline is given of their life-history. The measures advocated are the collection of adults during the flight period by shaking them from the trees in the morning into buckets of water; they may be given to birds or pigs as food or used as manure. The larvae should be collected behind the plough, and trap crops such as lettuce or strawberries should be grown between the rows of seedlings in nurseries.

Places intended for setting out seedlings in years when the adults are expected in abundance should be thickly sown with cereals in autumn or early spring, so that by the time the adults are ready to oviposit the ground is covered with green vegetation, this being an unfavourable condition for egg-laying.

Other measures suggested are the treatment of the soil by injection of carbon bisulphide or by watering with Paris green dissolved in ammonia.

Kozhevnikov (G.). **Нозематоз и гигиена пчел.** [Nosema Disease and Hygiene of Bees.]—**Пчеловодное дело** [*Apiculture*], no. 8, pp. 6–7. Moscow, June–July 1922.

Attention is drawn to the losses caused in bees due to *Nosema apis* and to the importance of general hygiene of the hives in connection with this disease.

Gorbatchev (K.). **К вопросу о нозематозе в Закавказье.** [On the Question of Nosematosis in Transcaucasia.]—**Пчеловодное дело** [*Apiculture*], no. 10, pp. 5–6. Moscow, September 1922.

In spite of careful observations extending over more than ten years the author has been unable to discover typical nosema disease of bees in Transcaucasia, though a similar affection occurs in which *Nosema apis* has never been isolated. This disease is always accompanied by considerable development of *Bacillus coli* and *B. proteus*. A similar condition has been observed near Petrograd.

Fletcher (T. B.). **Report of the Imperial Entomologist.**—*Sci. Repts. Agric. Res. Inst., Pusa, 1921–22*, pp. 51–67, 3 plates. Calcutta, 1922. [Received 1st January 1923.]

The work on borers in sugar-cane and other Graminaceous plants has been continued. Three species of borers in the larval stage have been found in *Imperata arundinacea*. *Diacrisia obliqua* became a major pest at Pusa, after an interval of ten years, and attacked soy beans, sann-hemp, jute, cowpeas, *Phaseolus radiatus*, *P. aconitifolius*, castor and *Dolichos lablab*. It was checked by hand-picking the egg-masses and young larvae whilst still gregarious. *Monophlebus octocaudatus* is again increasing in numbers, and attacked mango and peach. Eggs collected in June hatched in November, and they hatch at about the same time under natural conditions. *Microtermes obesus* attacking growing sugar-cane was checked by the application of crude oil emulsion to the irrigation water. The collection and liberation of Coccinellid beetles in experimental plots of wheat attacked by an Aphid (? *Macrosiphum granarium*) gave good results. It is probable that the local custom of growing wheat intermixed with mustard is beneficial in this respect, as the Coccinellids bred on the mustard Aphids later on attack the Aphids on the wheat.

A cigarette factory reported extensive damage due to the beetle, *Lasioderma serricorne*, and fumigation with hydrocyanic acid gas was recommended, experiments having shown that the flavour of the cigarettes would not be affected.

Work on the relative immunity of varieties of cotton was continued as in previous years. The distribution of *Earias fabia*, *E. insulana*, and *Platyedra gossypiella* was studied, and the rôle of *Oxycarenus laetus* and its life-history were worked out. There is considerable danger of *Anthonomus grandis* (boll-weevil) being introduced from America, and of other pests from Uganda. Examination has shown that some bales contain broken cotton stalks, leaves and whole seeds. The situation is being watched.

Among the insects received during the year are *Amsacta moorei*, attacking *Andropogon sorghum* and *Phaseolus mungo radiatus*; *Rhynchocoris humeralis* and *Cappaea taprobanensis* (?) on orange; *Monochamus versteegi* and *Rhytidodera simulans* (?) on mango; and *Anomis involuta*, Wlk. (previously recorded as *Cosmophila sabulifera*, Gn.),

attacking fibre leaves. The Eucosmid, *Crocidosema plebeiana*, Zell., was reared on hollyhock, and although recorded from Ceylon has not been definitely noted in India before.

Among the insects the life-histories of which were studied during the year are: *Nymphula turbata*, Butl., reared from larvae feeding on leaves of *Marsilea quadrifolia*; *Terias silhetana* and *Dichocrocis punctiferalis*, Gn., reared on leaves of *Caesalpinia bonducella*; *Cosmopteryx bambusae*, Meyr., reared from larvae mining leaves of *Saccharum fuscum*; *C. mimetis*, Meyr., again bred from larvae mining leaves of *Cyperus rotundus*; the Hesperid, *Suastus gremius*, reared from larvae on leaves of a date palm (*Phoenix sylvestris*); and *Silvanus surinamensis*, L., infesting stored walnuts. Larvae of *Stromatium barbatum*, F., boring in dead wood under dry conditions, were still living after five years in the larval stage; *Carpophilus nitidulus* was reared from larvae found living in dried figs and dates purchased in Calcutta. A small Mordellid beetle, not yet identified, was reared from larvae found boring in stems of *Lippia nodifolia*.

JAMESON (A. P.). **Report on the Diseases of Silkworms in India.**—vi + 165 pp., 8 plates, 5 graphs, 29 tables. Calcutta, Supt. Govt. Printing, 1922. Price *Rs*.3. [Received 1st January 1923.]

The introduction to this report gives a historical sketch of silkworm diseases in India. A full account is given of the various diseases of the Muga silkworm, *Antheraea assamensis*, the Tasar silkworm, *A. mylitta*, the Eri worm, *Attacus ricini*, and the mulberry silkworms, *Bombyx* spp., together with the author's conclusions and recommendations.

Among the enemies of mulberry silkworms is *Tricholyga bombycis*, a Tachinid that is only found in Bengal and Assam. As a rule the larvae are only attacked when they have passed the third or fourth moult. If no very serious damage is done, the cocoon is spun, but the adults do not develop, and such cocoons are useless for reeling purposes. The fly is very active on the wing. Pairing is said to take place in the air, and the female produces about 200 eggs. These are laid on the caterpillars and hatch in 15–20 hours. The larvae eat their way into the tissues of the silkworm, where they live for about 7 days. Pupation occurs about an inch below the surface of the ground, this stage lasting 10 or 12 days. This Tachinid rarely causes total loss of the brood, but on occasions about one-half of a rearing may be destroyed. The measures recommended are the destruction of all maggot-infested larvae and cocoons. Where practicable the windows and ventilators should be covered with wire gauze. The burning of a smoky fire in the entrance of the rearing room towards the end of the life of the silkworm may help to keep the parasite away. The practice of rearing only every alternate *bund* is a good one, but is not rigidly carried out, and even if it were, it would not stamp out the pest, as it almost certainly has other hosts. The author considers that this problem should be investigated by an entomologist.

SORHAGEN (L). **Beiträge zur Biologie europäischer** *Nepticula*-**Arten.** [Contributions to the Biology of European Species of *Nepticula*.]—Reprint, 60 pp., 7 figs., 4 col. plates, from *Arch. Naturgeschichte*, lxxxviii, Abt. A, no. 3. Berlin, June 1922. [Received 1st January 1923.]

In this paper notes are given on the distribution and biology of each species of *Nepticula*, with brief descriptions of the larva and of the leaf-mine made by it. There is a key to the mines and larvae divided according to the groups of plants infested, and also one to the adult moths.

CALVINO (M.). **Per distruggere la "mosca prieta."** [The Destruction of *Aleurocanthus woglumi*.]—*Rev. Agric., Com. y Trabajo*, v, pp. 4–6, 6 figs. Havana, 1922. (Abstract in *L'Agric. colon.*, xvi, no. 12, pp. 452–453. Florence, December 1922.)

In combating *Aleurocanthus woglumi* on mango and orange trees at Santiago de las Vegas, Cuba, the author successfully adopted the method previously used by him against *Phloeothrips oleae* on olives in Italy. This consisted in cutting off all the branches of infested and non-infested olive trees within a radius of 100–200 yards and immediately burning them. In the present case this was done in January and February. The oranges were the first to start into growth, being covered with new shoots in about a month. At the time of writing the trees were in better condition than had previously been the case, and the few remaining individuals of *A. woglumi* were easily dealt with by spraying.

CALVINO (M.). **Nuovo metodo di lotta contro il "pasador" del tabacco a Cuba.** [A new method against Elaterid Larvae attacking Tobacco in Cuba.]—*Rev. Agric., Com. y Trabajo*, v, p. 15, 1 fig. Havana, 1922. (Abstract in *L'Agric. colon.*, xvi, no. 12, pp. 453–454. Florence, December 1922.)

The name "pasador" is applied in Cuba to Elaterid larvae that attack tobacco seedlings immediately they are planted out. The common species is *Heteroderes amplicollis*, Gyll., but there are others such as *Monocrepidius* (*Conoderus*) *bifoveatus*, Beauv., and *Megapenthes opaculus*, Cand. As it had been noticed that no damage was done to seedlings in ground soaked with water, the effect of planting out the tobacco after letting water flow through the trench was tried. The seedlings are pushed in with the finger into the side of the trench that has been thus wetted. Four or five days later the trench is again flooded with water, the plants are then manured and the manure covered with dry soil. This method was a sure protection against the larvae, besides being agriculturally advantageous.

CALVINO (M.), RAMIREZ (R.) & RIQUELME INDA (J.). **El jitomate y sus enfermedades.** [The Tomato and its Diseases [and Pests].]—*Dirección Agric. Mexico*, N.S. Bol. 107, 72 pp., 9 figs., 30 plates. Mexico, 1920. [Received 2nd January 1923.]

The principal insect pests of tomatos in Mexico are :—Lepidoptera : *Protoparce* (*Phlegethontius*) *sexta*, L., *Prodenia ornithogalli*, Gn., *Heliothis obsoleta*, F., *Loxostege similalis*, Gn., *Laphygma frugiperda*, S. & A., *Agrotis ypsilon*, Rott., and *Lycophotia* (*Peridroma*) *margaritosa*, Haw. (*saucia*, Hb.). Rhynchota : *Leptoglossus phyllopus*, L., *L. oppositus*, Say, *Halticus citri*, Ashm. (*canus*, Dist., *uhleri*, Ger.), *Dicyphus minimus*, Uhl., *Trialeurodes* (*Aleurodes*) *vaporariorum*, Westw., and *Aphis gossypii*, Glover. Coleoptera : *Epicauta lemniscata*, F., *Leptinotarsa multitaeniata*, Stål, *Euphoria inda*, L., *Epitrix cucumeris*, Harr., and *Systena blanda*, Mels.

GANDARA (G.). **Enfermedades y plagas del naranjo.** [Diseases and Pests of the Orange.]—*Dirección Agric. Mexico*, N.S. Bol. 111, 41 pp., 62 figs. Mexico, 1920. [Received 2nd January 1923.]

A number of pests of the orange have been noticed in the State of Yucatan, Mexico. These include a Nematode, *Heterodera*

dicicola, and the Coccids, *Chionaspis citri*, *Chrysomphalus* (*Aspidiotus*) *aurantii*, *C. aurantii citrinus* and *Lepidosaphes beckii* (*Mytilaspis citricola*). Neither *Icerya purchasi*, which occurs in the State of Sonora, nor *Coccus* (*Lecanium*) *hesperidum*, which is common on the Mexican coast, were observed. Other Rhynchota were *Raphigaster hilaris*, *Metapodius femoratus* and *Euthochtha galeator*. A fruit-fly, probably *Anastrepha* (*Trypeta*) *ludens*, occurs on guava, but has not attacked the orange in Yucatan. The ants, *Atta fervens* and *Oecodema mexicana*, are responsible for considerable losses. Other pests are the Longicorn beetles, *Dendrobius maxillosus*, *Stenaspis verticalis*, *Malacopterus lineatus*, *Elaphidion inerme* and *E. parallelum*, and the mites, *Tetranychus sexmaculatus*, *T. bimaculatus* and *Eriophyes* (*Typhlodromus*) *oleivorus*.

RAMÍREZ (R.). **Gorgojos y palomillas de los graneros y de las harinas.** [Beetles and Moths of Grain Stores and Flours.]—*Sec. Agric. y Fomento*, Circ. 5, 7 pp., 12 figs. Mexico, 1921. [Received 2nd January 1923.]

This is a second edition of the author's bulletin giving brief notes on *Calandra granaria*, *C. oryzae*, *Bruchus obtectus*, *Tribolium confusum*, *Tenebrio molitor*, *Silvanus surinamensis*, *Sitodrepa panicea*, *Attagenus piceus* and *Sitotroga* (*Gelechia*) *cerealella*. Carbon bisulphide is the fumigant mentioned as being most suitable against them.

DE LA BARREDA (L.). **La hormiga arriera** (*Atta fervens*.) [The Carrier Ant, *A. fervens*.]—*Dirección Gen. Agric.*, Bol. Agric. 1, 14 pp., 3 figs. Mexico, 1922. [Received 2nd January 1923.]

The leaf-cutting ant, *Atta fervens*, is a serious pest in Mexico, orange trees and coffee bushes being defoliated with extraordinary rapidity. Fumigation of the nests with burning sulphur or with carbon bisulphide is recommended. Hydrocyanic acid gas is highly effective, but too dangerous for general use. The workers may be killed by pouring a 2½ per cent. solution of potassium cyanide down the exit-hole of the nest, or a mixture of equal parts of London purple (calcium arsenate coloured with rose aniline) and some inert substance such as chalk may be spread in a ridge round the hole. Plants may be protected by binding flax or similar material round the foot of the stem and dusting it with the arsenical.

PETTIT (R. H.). **Report of Section of Entomology.**—*60th Ann. Rept., Michigan State Bd. Agric., 1920–21*, pp. 184–187. East Lansing, Mich., 1922. [Received 2nd January 1923.]

For several years complaints have been made of the losses caused by the grape-berry moth [*Polychrosis viteana*], and efforts are being made to find more effective remedies for it. A serious outbreak of *Typhlocyba tricincta* (grape leaf-hopper) occurred. The best time for spraying is before the first nymphs attain their wings, and this will be before all the eggs have hatched. A combination of Bordeaux mixture and Black-leaf 40 with soap seems the most effective.

Owing to the mild winter the pear psylla [*Psylla pyricola*] spread everywhere and gave signs of being more troublesome than ever before. Spraying against the adults would have been useless, and a spray against the eggs was tried. Lime-sulphur, 1 to 7, applied just as the blossom buds separated into clusters in the standard

varieties, gave good results, although some buds were killed. This, however, seemed a minor evil compared with a certain loss of the crop and possible loss of the trees.

Attempts were made to destroy the eggs of *Tortrix* (*Archips*) *argyrospila* (fruit-tree leaf-roller) by spraying with scalecide at the rate of 1 part to 12½ of water, when the leaf buds burst; the number of larvae was much reduced. Bordeaux mixture seems to be the best repellent for the potato leaf-hopper [*Empoasca mali*]. The addition of Black-leaf 40 kills the immature hoppers that are hit by the spray at the time of application.

Grasshoppers caused serious damage all through the summer of 1920. The sawdust bait seems to be effective. The substitution of coarse crude poison or lead arsenate for white arsenic is unsatisfactory, and if an excess of salt is used the grasshoppers are able to obtain enough to satisfy them without being poisoned. In the summer of 1920 experiments in the more exact timing of the August spray for the second generation of the codling moth [*Cydia pomonella*] were started. Tests were also made with a new mixture to repel borers and protect fruit trees, and it is hoped to produce something that will protect young orchards from the flat-headed apple-tree borer [*Chrysobothris femorata*].

Larvae of *Olethreutes abietana* have been devouring the leaves of blue spruce. This moth is difficult to control, as the larvae are hard to reach with lead arsenate.

FULLER (C.). [**Report of the Division of Entomology, 1921–22.**]—*Jl. Dept. Agric. Union S. Africa*, v, no. 6, pp. 542–545. Pretoria, December 1922.

The work carried out during 1921–22 by the various branches of the division of entomology in South Africa is briefly reviewed.

In the Eastern Cape Province investigations included a study of the life-histories of the false codling moth [*Argyroploce leucotreta*] in the Bathurst district; of *Epilachna similis*, which destroys barley, maize and wheat; of *Crocidolomia binotalis* (larger cabbage moth), which in the larval stage destroys cruciferous plants, particularly cabbage and cauliflower; of *Acanthomia tomentosicollis* (bean bug), destructive in bean fields in the coastal districts; of *Colias electo* (lucerne caterpillar); of *Parasa* sp., the larvae defoliating *Acacia cyclops* and *A. salina*, near Port Elizabeth; and of *Pyralis farinalis*.

TAKAHASHI (R.). **Some Malayan Aphididae.**—*Philippine Jl. Sci.*, xxi, no. 5, pp. 421–422. Manila, November 1922.

The species here recorded were collected in the vicinity of Johore and comprise *Aphis gossypii*, Glover, on *Hibiscus rosasinensis*; *A. medicaginis*, Koch, on a plant belonging to the Leguminosae; *A. shirakii*, Takah., on leaves of *Melastoma candidum*; and *Setaphis viridis*, v.d.G., on an unknown plant.

JONES (W. W.). **Green Soldier Bug as Peach Pest.**—*Better Fruit*, xvii, no. 6, p. 9, 1 fig. Portland, Oregon, December 1922.

Nezara hilaris, Say (green soldier bug) is recorded from Utah as causing serious losses in peach orchards by sucking the juice of the fruit. A brief account is given of its life-history. All fallen leaves and trash should be burnt in the late autumn or early winter. It may also be advisable to place trap heaps of trash in warm dry places among the trees.

OLSON (G. A.). **Gypsum as an Arsenate Poison Carrier.**—*Better Fruit*, xvii, no. 6, pp. 13 & 26. Portland, Oregon, December 1922.

Agricultural gypsum (land plaster) is recommended as a carrier for arsenate poisons. Against the potato beetle [*Leptinotarsa decemlineata*], caterpillars and other leaf-eating insects, 1 part of lead arsenate to 50 of agricultural gypsum forms a useful dust. Up to 2½ parts of lead arsenate may be used in the same amount of carrier, and in exceptional cases even 5 parts. In some localities 1 part of Paris green is used to 99 parts of gypsum. A preparation consisting of 1 part of calcium arsenate and 20 parts of agricultural gypsum gave very satisfactory results in cucumber fields, the yield amounting to 207 lb. more per acre than on the untreated plots. The application of 1 part of lead arsenate mixed with 20 parts of gypsum produced an increase in yield of 170 lb. per acre over the untreated plots. The mixture of calcium arsenate and agricultural gypsum is an effective repellent of cucumber beetles [*Diabrotica*]. Applications should be made when the plants are small and tender, thus controlling the beetles before they can lay their eggs and thereby make the conditions favourable to wilting or mosaic disease. The sulphur, in sulphate form, contained in agricultural gypsum also serves as a plant food.

HALLETT (H. M.). **Beetles in Imported Timber.**—*Ent. Mo. Mag.*, lix, pp. 13-14. London, January 1923.

Pit-wood (pine, etc.) imported from France was found to be infested with various beetles; these include the Scolytids, *Ips* (*Tomicus*) *sexdentatus*, in the burrows of which *Hypophloeus fraxini* was also found, *Ips suturalis* (*T. nigritus*), *Xyleborus eurygraphus*, *Crypturgus cinereus*, *Hylastes attenuatus*, and *Hylurgus ligniperda*; the Histerids, *Paromalus flavicornis* and *P. parallelopipedus*; and the Nitidulid, *Carpophilus marginellus*. The importation of infested wood into colliery districts is considered to be a source of danger to the neighbouring forests. The Histerid, *Platysoma oblongum*, found under oak bark in Wales, was probably imported in this manner.

BEARE (T. H.). *Phloeosinus thujae*, **Perris, an Addition to the British List.**—*Ent. Mo. Mag.*, lix, pp. 14-15. London, January 1923.

Attention is drawn to the occurrence of *Phloeosinus thujae*, Perris [*R.A.E.*, A, x, 562] in Great Britain.

BEDWELL (E. C.). *Araeocerus fasciculatus*, **De Geer, at Woolwich.**—*Ent. Mo. Mag.*, lix, p. 15. London, January 1923.

Attention is drawn to the occurrence of the Anthribid, *Araecerus fasciculatus*, DeG., in spice works at Woolwich in nutmegs from Singapore; though Jamaica nuts showed more signs of attack, no beetles were found in them.

JARVIS (H.). **Fruit Fly Investigations.**—*Queensland Agric. Jl.*, xviii, pt. 5, pp. 344-345. Brisbane, November 1922.

Attempts have been made to discover any indication of the fruit fly, *Dacus ferrugineus* (*Bactrocera tryoni*), overwintering in the Granite Belt, but as neither living pupae nor adults were found, it would appear that this fly is a seasonal visitor from lower altitudes.

Oil sprays used during the winter on the eggs of *Bryobia* sp. have not proved entirely successful, but on living mites oil sprays (1 part red oil : 30 water), and the lime-sulphur and arsenate sprays used for woolly aphis [*Eriosoma lanigerum*] and codling moth [*Cydia pomonella*] respectively should prove satisfactory. *Melampsalta* sp. has been observed ovipositing in the wood of grape vines, this being the first instance, to the author's knowledge, of a cicada ovipositing in the vine. The larva of a Xyloryctid moth has also been received from the same source. Various sprays have been tested for *Myzus cerasi* (peach aphis), with no satisfactory results.

BALFOUR-BROWNE (F.). **On the Life-History of** *Melittobia acasta*, **Walker; a Chalcid Parasite of Bees and Wasps.**—*Parasitology*, xiv, no. 3-4, pp. 349-369, 1 plate. Cambridge, December 1922.

A full account is given of the life-history and habits of *Melittobia acasta*, Wlk., as the result of observations made in 1918 and 1921 at Cambridge. This Chalcid is parasitic on a number of bees, wasps and flies. A list is given of the genera of the hosts previously recorded, as well as of those experimented with. In the case of flies the pupa is attacked. Under laboratory conditions almost any larva or pupa of bee or wasp is attacked, and even Coleopterous larvae and pupae may serve as food for both imago and larva. *Osmia rufa* appears to be the only host upon which *M. acasta* does not really flourish, probably owing to some quality in the blood that has a deleterious effect upon the parasite.

Under natural conditions the adults of *M. acasta* appear some time after the middle of May, and may be found as late as September. Under laboratory conditions successive generations may be maintained throughout the winter with the aid of an incubator kept at summer temperatures, the technique employed being described in detail. Under natural conditions there may be 2–5 or even more generations a year. The occurrence of cannibalism among the larvae and the difficulty of migration of the species greatly reduce its importance as an enemy of many bees and wasps.

This Chalcid is in all cases an ectoparasite, the egg being loosely attached to the surface of the host. The adult females feed on the blood of the host, which they obtain by inserting the ovipositor and then sucking at the wound thus produced. Many such wounds may be inflicted on one host, either egg, larva or pupa, without apparently preventing normal development. The females also apparently puncture the host in order to check its development for the benefit of their offspring. Incubation varies from 2 to 9 days. The larva feeds on the host and under favourable food and weather conditions is full-grown in 8 or 9 days; it takes on the colour of the host on which it is feeding, but at maturity the colour thus acquired disappears. The pupal period may vary between about 7 days and 10 months. The winter is generally passed in the larval stage, though overwintering pupae have occasionally been found.

A Weevil destructive to Snowdrop Bulbs.—*Jl. Minist. Agric.*, xxix, no. 10, pp. 951–952, 1 plate. London, January 1923.

A consignment of snowdrop bulbs imported in July 1922 from Smyrna was infested with larvae of *Brachycerus* sp. This genus of weevils has not been previously recorded in Great Britain, but several species are

known in Russia and in Mediterranean districts, where they are bulb feeders. It is uncertain whether this weevil will be able to establish itself in Britain, but it would be unwise to allow it to spread, as it also attacks onions.

KARNY (H.). **Zur Systematik der Orthopteroiden Insekten.** [A Contribution to the Classification of Orthopterous Insects.]—*Treubia*, i, no. 4, pp. 163–269. Buitenzorg, August 1921.

This paper includes a section on the Thysanoptera, with a key to the families and genera.

TREHERNE (R. C.). **Karny's Key to the Phloeothripidae.**—*Proc. Ent. Soc. Brit. Columbia*, Syst. Ser., no. 20, pp. 42–55. Vancouver, B.C., September 1922.

This is a translation of one of the keys mentioned in the preceding paper.

HUNTER (W. D.). **Recent Developments in Relation to the Pink Bollworm Situation in the United States.**—*Qtrly. Bull. State Pl. Bd. Mississippi*, ii, no. 1–2, pp. 3–6. Agricultural College, Miss., April–July 1922.

This information concerning the pink bollworm [*Platyedra gossypiella*, Saund.] in Texas and Louisiana has already been noticed elsewhere [*R.A.E.*, A, x, 595].

GRIMES (D. W.). **The Chrysanthemum Gall Midge.**—*Qtrly. Bull. State Pl. Bd. Mississippi*, ii, no. 1–2, pp. 8–9. Agricultural College, Miss., April–July 1922.

Diarthronomyia hypogaea, Lw., is recorded for the first time from Mississippi. It is a most serious pest of chrysanthemums, and a brief account is given of its habits. All plants and cuttings should be carefully examined before being admitted to commercial houses where such plants are grown, and as a further precaution they should be dipped in or sprayed with a solution of 1 oz. soap, 1 U.S. gal. water and a teaspoonful of 40 per cent. nicotine sulphate (Blackleaf 40). The treatment should be applied every four or five days for about two months, or until no more galls are found.

HARNED (R. W.). **A New Sugar Cane Borer.**—*Qtrly. Bull. State Pl. Bd. Mississippi*, ii, no. 1–2, pp. 11–12. Agricultural College, Miss., April–July 1922.

A Noctuid, an apparently new sugar-cane borer, has been discovered in Mississippi. It is a voracious feeder, and if abundant may easily become a serious pest. Preliminary investigations, including life-history studies and scouting, have been started.

HARNED (R. W.). **A New Potato Weevil in Mississippi.**—*Qtrly. Bull. State Pl. Bd. Mississippi*, ii, no. 1–2, pp. 6–8. Agricultural College, Miss., April–July 1922.

A weevil, the identity of which is uncertain, has been found causing injury to potatoes, tomatos and turnips in Mississippi. It may be *Listroderes* (*Desiantha*) *nociva* [a South American species apparently

introduced into Australia]. It is easily controlled by the methods generally used against the Colorado potato beetle [*Leptinotarsa decemlineata*, Say], the application of lead arsenate having given almost perfect control.

The Buff-coloured Tomato Weevil of Australia in South Mississippi.—*Qtrly. Bull. State Pl. Bd. Mississippi*, ii, no. 3, pp. 23-26. Agricultural College, Miss., October 1922.

In view of the occurrence of *Listroderes* (*Desiantha*) *nociva* (buff-coloured tomato weevil) in Southern Mississippi [see preceding paper], an account of it in Australia already noticed [*R.A.E.*, A, iv, 109], is here reprinted.

Holloway (T. E.). U.S. Bur. Ent. **The Sugar Cane Moth Borer in South Mississippi.**—*Qtrly. Bull. State Pl. Bd. Mississippi*, ii, no. 3, pp. 4-8, 2 figs. Agricultural College, Miss., October 1922.

Diatraea saccharalis crambidoides, Grote (sugar-cane moth borer) is becoming more noticeable in South Mississippi. An outline is given of its life-history and the damage it does. Under Mississippi conditions control should be comparatively simple, as the average individual plantings are less than half an acre in extent. The methods suggested are the planting of cane free from borers, the destruction of all scraps of cane left after cutting and grinding, and the cutting out in the spring of the young plants killed by the borers.

Cunliffe (N.) & Ryle (G. B.). **The Conifer Spinning Mite on Sitka Spruce,** *Oligonychus* (*Paratetranychus*) *ununguis*, **Jacobi.**—*Qtrly. Jl. Forestry*, xvii, no. 1, pp. 359-362, 1 plate, 1 fig. London, January 1923.

The mite, *Paratetranychus ununguis*, has recently been found in large numbers on Sitka spruce [*Picea sitchensis*] in Bagley Wood, near Oxford. All stages feed on the sap of the needles, their attack being as a rule confined to the epidermal cells and those immediately beneath them. The damage thus caused makes its appearance very gradually. In the autumn the foliage of the attacked trees appears dull and dusty, and many of the needles fall prematurely. The autumn generation lays its eggs in crevices of the bark of the youngest shoots, especially round the base of the bud, hibernation occurring in the egg stage. In the spring the emerging mites spin a very loose webbing over the twigs. This is very difficult to distinguish, and serves as a protection, successive generations feeding and reproducing under it until the foliage is exhausted.

In the infestation under discussion *P. ununguis* was only found on Sitka spruce and never on nursery seedlings or two-year-old plantations. The heaviest infestation occurred on trees of about four years old, but there is no evidence that sickly or suppressed trees are attacked in preference to healthy ones.

Nurseries should be carefully inspected for the occurrence of this pest and treated immediately with soap emulsion, quassia-nicotine emulsion or lime-sulphur sprays, all of which have been successfully used in Sweden [*R.A.E.*, A, iii, 435].

[P]OTILA (J. E.). **Leafhopper Injury to Potatoes.**—*Michigan Agric. Expt. Sta.*, Tech. Bull. 56, 27 pp., 13 figs. East Lansing, Mich., July 1922.

The present bulletin gathers together the results of the author's investigations into the cause and control of hopperburn of potatoes. The transmitting agent, *Empoasca mali*, LeB., has two complete generations each season in Michigan, lasting approximately one month from the laying of the eggs to the emergence of the adults. The time of planting plays an important part in the amount of hopperburn occurring in a field, those planted after 15th June showing very little injury.

WINTER (O. B.). **Report on Insecticides and Fungicides.**—*Jl. Assoc. Official Agric. Chemists*, iv, no. 3, pp. 395–403. Washington, D.C., 15th February 1921. [Received 8th January 1923.]

Various methods of analysing the arsenic content of London purple and Paris green are discussed and the results compared. No satisfactory method was found for removing the colour in order to determine the arsenic trioxide in London purple. It is thought that it may be unnecessary to use water free from carbon dioxide for determining the water-soluble arsenic in lead arsenate. It is suggested that further studies be carried out on similar lines, recommendations being made for special points requiring further investigations.

PATTEN (A. J.). **The Solubility of Calcium and Magnesium Arsenates in Carbon Dioxide and its Relation to Foliage Injury.**—*Jl. Assoc. Official Agric. Chemists*, iv, no. 3, pp. 404–406. Washington, D.C., 15th February 1921. [Received 8th January 1923.]

There appears to be conclusive evidence that the determination of water-soluble arsenic oxide is not a satisfactory measure of the safety in using calcium or magnesium arsenate. It is questionable whether they can under any circumstances be used safely on tender foliage; the problem requires further investigation, as does also the insecticidal efficiency and the action of magnesium pyroarsenate on foliage.

GRAHAM (J. J. T.). **The Determination of Water-Soluble Arsenic Oxid in Calcium Arsenate. An Investigation to determine the Correctness of the Official Method for Water-Soluble Arsenic in Lead Arsenate, when applied to Calcium Arsenate.**—*Jl. Assoc. Official Agric. Chemists*, iv, no. 3, pp. 406–408. Washington, D.C., 15th February 1921. [Received 8th January 1923.]

A comparison has been made between the official, distillation and gravimetric methods for the determination of water-soluble arsenic in lead arsenate as applied to calcium arsenate. The close agreement of the results shows that the official method is applicable to calcium arsenate also.

PATCH (E. M.). **A Meadow Caterpillar.**—*Maine Agric. Expt. Sta.*, Bull. 302, pp. 309–320, 2 figs. Orono, Maine, December 1921. [Received 8th January 1923.]

A popular account of the life-history of *Ctenucha virginica* (meadow caterpillar) is given. In 1920 as many as 4,000 to the acre were observed on grass. The season of 1921 was favourable to the

following parasites of it: *Labrorychus* sp., near *prismaticus*, Nort., *Amblyteles* sp., *Coelopisthia* sp. near *confusa*, Gir., *Iseropus coelebs*, Walsh, and *Telenomus spilosomatis*, Ashm.

PATCH (E. M.). **Rose Bushes in Relation to Potato Culture.**—*Maine Agric. Expt. Sta.*, Bull. 303, pp. 321–344, 1 fig. Orono, Maine, December 1921. [Received 8th January 1923.]

A brief account is given of the life-history and habits of *Macrosiphum solanifolii* (pink and green potato aphis), with a list of its primary and secondary food-plants [*cf. R.A.E.*, A, iv, 133]. Many instances are given that point to the conclusion that potato fields near rose bushes are in greater danger of being attacked by this Aphid than those further from the source of infestation, and even so short a distance as a quarter of a mile may sometimes be great enough to make the difference between heavy and slight attacks. The measures recommended are the destruction of rose bushes, and the most favourable time for this in Northern Maine or New Brunswick is October or November, the operation being repeated in the spring if overlooked shoots are found at that time. If this is not done in the autumn, any time before May will serve. If destruction is not practicable, a thorough spraying early in September and another early in June will greatly reduce the numbers on rose bushes. If Aphids are present, all plants that have been rogued should be removed at once or treated so as to render them harmless. This Aphid was not found in spring on any vegetation other than the rose until after the migration season had begun, and the author is strongly of opinion that the rose is the one primary host on which it overwinters. Mosaic disease has been observed to spread badly during a heavy Aphid infestation, and all fields where the disease was on the increase were near enough to rose bushes to receive migrants from them, and those where it was on the decrease were a considerable distance from rose bushes or in situations unfavourable to Aphid life. This Aphid is probably the most effective cause of the spread of potato mosaic, but the problem will not be solved with its elimination. Other insects that on occasions may function as carriers are *Empoasca mali* and other leaf-hoppers, certain Cercopids, and *Cosmopepla carnifex*. If *Lygus pratensis* is a carrier of the disease, it may outrank in importance all other potato insects except *M. solanifolii*.

A survey undertaken in 1921 in New Brunswick showed Aphids to be conspicuously more abundant in sheltered fields near sheltered rose bushes than in localities where both potatoes and roses were exposed to high winds.

SCHNEIDER-ORELLI (O.). **Die Reblaus und unser Weinbau.** [The Vine Louse and our Viticulture.]—*Neujahrsblatt Naturforsch. Ges. Zürich, 1923*, no. 125, 15 pp., 4 plates, 4 figs. Zurich, 1923.

A concise description is given of the origin and spread of *Phylloxera vastatrix*, Pl., the manner in which new infestations occur, and the measures adopted against this pest. Börner's distinction of two races (the South European *vitifolii* race, capable of attacking all stocks, and the North European *pervastatrix* race, which cannot attack some American stocks) is confirmed as regards Switzerland by the author's experiments.

DEMAISON (C.). **Sur un parasite peu connu des céréales.**—*Jl. Agric. prat.*, xxxix, no. 1, pp. 17–18. Paris, 6th January 1923.

A yellowing in irregular patches among cereal crops in early spring is due to infestation by *Hylemyia coarctata*, Fall., first recorded officially in France about 1908. Larvae collected from December to March yield adult flies in May and June. These appear to oviposit on wild grasses. The second brood is the one that oviposits in the stems of autumn cereal crops. In Champagne rye seems almost immune, winter barley suffers more, but wheat is usually the crop that is most affected.

Norme per l'applicazione delle disposizioni fitopatologiche (malattie delle piante). [Rules for the Application of the [Italian] Phytopathological Regulations (Diseases of Plants).]—Separate, 23 pp., from *Boll. Ufficiale Minist. Agric.*, i, no. 15. Rome, 15th August 1922. [Received 9th January 1923.]

The functions of the Italian Phytopathological Service consist of studying diseases and pests of plants and methods of combating them, the supervision of the growing and marketing of plants in order to prevent the introduction and spread of pests, and the organisation and direction of agricultural syndicates for dealing with certain pests and diseases. This publication embodies the rules to be followed in the execution of these duties, and includes a list of the various stations to which the work is entrusted.

CLEARE (L. D.). **Notes on Small Moth-borers of Sugar-cane in British Guiana.**—*Jl. Bd. Agric. British Guiana*, xv, no. 4, pp. 163–184, 3 tables. Demerara, October 1922.

The bionomics of *Diatraea saccharalis*, F., *D. canella*, Hmpsn., and *D. lineolata*, Dyar, are briefly recorded. Notes are given on the character of injury to sugar-cane in British Guiana, estimation of losses, artificial dissemination and factors influencing the presence of moth-borers. The measures recommended are the forking of both banks as soon as the tops are planted, and the consequent elimination of false rows or old banks, which are an important source of early infestation. Tops should be immersed in water for 72 hours before planting. Refuse tops and pieces of cane left in the field should be destroyed by ploughing in or burning, which also eliminates attacks by *Metamasius hemipterus*, L., and termites. Stumping should be abolished as far as possible. Acreage under old canes should be reduced to a minimum. Egg-clusters and larvae should be collected by hand and parasitised clusters returned to the fields. Parasites of the eggs are *Trichogramma minutum*, Riley, and *Prophanurus alecto*, Cwfd.; of the larvae, *Iphiaulax medianus*, Cam., *Cremnops parvifasciatus*, Cam., *Mesostenoideus* sp. and an undetermined Dexiid; and of the pupa, *Heptasmicra curvilineata*, Cam.

CARPENTER (L.). **Chemistry and the Destruction of Pests in Agriculture.**—*Jl. Bd. Agric. British Guiana*, xv, no. 4, pp. 190–195. Demerara, October 1922.

Information is given on the preparation of various substances for the destruction of insect and fungus pests of agriculture. Those dealt with are arsenic, in various forms, sulphide and polysulphide

preparations, infusions of tobacco stalks for extracting nicotine, pure nicotine, preparations of phenol and naphthalene, carbon bisulphide, and Bordeaux and Burgundy mixtures.

JACAZIO (A.). **La coltivazione industriale del susino.** [The Industrial Cultivation of the Plum.]—*Il Picentino*, xi, no. 12, pp. 192–195. Salerno, 30th December 1922.

Among the insect pests attacking plums near Salerno are *Aphis cardui* (*pruni*) and *Hyalopterus arundinis* (*pruni*), which may be checked by spraying with a solution containing 1·5 per cent. soap and 1·5 per cent. tobacco extract of 10 per cent. nicotine content; the scales, *Aspidiotus* (*Aonidiella*) *perniciosus*, *Epidiaspis piricola* (*Diaspis ostreaeformis*) and *Parlatoria calianthina*, against which a polysulphide solution is effective; and Lepidopterous larvae and Hymenopterous larvae (*Neurotoma*), for which a lead arsenate spray is advised.

FAURE (J.). **Sur un mode de défense de** *Brassica oleracea* **(L.) contre les larves mineuses de** *Baris*.—*C.R. Soc. Biol.*, lxxxvii, no. 39, pp. 1332–1333. Paris, 1922.

Around Lyons the larvae of *Baris cuprirostris*, F., and *B. chlorizans*, Germ., occur in the stems of cabbage, and those of *B. laticollis*, Marsh., in the roots and in the base of the stem. These weevils oviposit from mid-May to mid-July, when the adults disappear. The larvae pupate within their mines. A few adults that emerge at the end of August or early in September give rise to a partial second generation. Later on the adults descend into the ground to hibernate. Throughout the winter larvae and pupae are to be found inside the cabbages. Roots develop at the places injured by the larvae; those put forth externally into the soil contribute to the nourishment of the plant, while those occurring inside the mines, though not dangerous to the larvae, are sometimes fatal to the pupae. Such a root enters the pupal chamber and winds round it, growing thicker as it lengthens, until the development of the pupa is stopped by the pressure exerted, or the pupa may develop, but the adult is deformed. This reaction on the part of the plant seems to cause a mortality of over 4 per cent. This was not observed in wild plants (*Raphanus, Sisymbrium*) infested by *Baris*.

KALSHOVEN (L.). **Zoölogische Bijdragen. 5. Een eigenaardige beschadiging van djati-toppen door schildluizen en een boorrupsje** (*Dichocrocis punctiferalis*, **Gn.**). [Notes on Forest Zoology for the Dutch East Indies. No. 5. A curious Injury of the Tops of Teak Trees by Coccids and a small boring Caterpillar (*D. punctiferalis*).]—*Tectona*, xv, pp. 944–950. With a summary in English. Buitenzorg, 1922. [Received 15th January 1923.]

In 1920 tops of teak saplings, damaged by borers, were received. A few had been attacked by *Zeuzera coffeae*, Nietn., about which the following additional information [*R.A.E.*, A, x, 624] is given. The attack is recognisable by the withering of the entire twig with its foliage and its fracture at the point where the mine comes out. Just beneath this opening the larva cuts through the wood a ring-shaped mine that causes the death of the twig. The reddish excreta are ejected through the opening and collect at the foot of the trunk. Only seedlings are killed by *Z. coffeae*. Other tops received were

twisted in the manner usual in infestation with Coccids, which are common pests of teak in Java, and were also damaged by Lepidopterous larvae that mined the terminal buds and the thick bases of the main ribs of the young leaves. The moths bred out proved to be *Dichocrocis punctiferalis*, Gn. Little information exists regarding this Pyralid in Java, where it has been noted as a pest of *Ricinus communis* and where it was once found in cacao pods. In British India it has been recorded on various food-plants, a list of which is given. It is not expected to become an important pest in Java.

KEMNER (N. A.). **Zur Kenntnis der Entwicklungsstadien einiger Sesiiden.** [A Contribution to the Knowledge of the Developmental Stages of some Aegeriidae (Sesiidae).]—*Ent. Tidskr.*, xliii, no. 1, pp. 41–57, 8 figs. Stockholm, 1922. [Received 15th January 1923.]

Though Aegeriid larvae are figured in works on Lepidoptera, no complete knowledge of them exists, nor are characters of use for identification purposes available. Keys are here given to the larvae and the pupae of the following species of economic importance: *Trochilium apiforme*, Cl., *Paranthrene (Sciapteron) tabaniformis*, Rott., *Pennisetia (Bembecia) hylaeiformis*, Lasp., *Aegeria (Sesia) scoliaeformis*, Bkh., *A. (S.) sphaeciformis*, Gerning, *A. (S.) tipuliformis*, Cl., *A. (S.) myopaeformis*, Bkh., *A. (S.) formicaeformis*, Esp., *A. (S.) culiciformis*, L., *A. (S). vespiformis*, L., and *Dipsosphecia ichneumoniformis*, F. In some cases a description is given of the eggs and of the places where they are deposited.

An account of the external anatomy of the larvae is followed by notes on their biology. Immediately after hatching the larvae penetrate into the part of the plant where they live. Some, such as *Aegeria scoliaeformis*, *A. formicaeformis* and *A. tipuliformis*, reach it at once, while others make special mines as young larvae, and are thus to a certain extent gall-forming. *Pennisetia hylaeiformis* first rings the underground stem superficially and later on penetrates to the centre. *Paranthrene tabaniformis* behaves in a somewhat similar manner. The old larvae of *Dipsosphecia* live in roots; those of *Trochilium*, *Sciapteron*, *Bembecia*, *Aegeria sphecijormis*, *A. culiciformis*, *A. tipuliformis*, etc., in small stems or in the shoots of living trees; and those of *A. scoliaeformis*, *A. formicaeformis* and *A. vespiformis*, beneath the bark. In living stems the food of the larvae consists chiefly of sap, and the larvae under the bark choose positions near the cambium rich in this substance. The developmental periods vary with different species, and are partly dependent on weather conditions and humidity. Most species require a year, some two, and in some cases *Trochilium* appears to need three years. Some larvae, such as those of *Trochilium*, enclose themselves in a stout cocoon, as they have gnawed the exit-hole and need its protection.

KEMNER (N. A.). **Zur Kenntnis der Entwicklungsstadien und Lebensweise der schwedischen Cerambyciden.** [A Contribution to the Knowledge of the Developmental Stages and Habits of Swedish Cerambycidae.]—*Ent. Tidskr.*, xliii, no. 2–4, pp. 81–138, 38 figs. Stockholm, 1922. [Received 15th January 1923.]

In the introduction to this paper a brief account is given of the biology and various stages of CERAMBYCIDAE, some species being taken as examples. The main part consists of short descriptions of the larvae

and pupae of the Swedish species. There is a key to the various groups of the family and one to the larvae of the subfamily LAMIINAE.

Lamia textor, L., is fairly common throughout Sweden in living willow and poplar, especially the root. *Monochamus sutor*, L., which has a one-year generation, is a pest of pines, but barking is an effective protection, as the larva develops in the bark. *Mesosa nebulosa*, F., occurs only in the south of Sweden; it has been taken from birch (*Betula*), *Carpinus betulus* and *Corylus avellana*, and appears to prefer the dead branches of standing trees. *Hoplosia fennica*, Payk., is found in branches of lime (*Tilia*), especially in dead ones, but also occurs in willow and beech; it has a one-year development. *Pogonochaerus fasciculatus*, DeG., is common, often associated with other beetles, in spruce and pine branches or in split fence wood. *P. hispidus*, L., in Sweden prefers lime branches, but occurs in other deciduous trees, such as *Sorbus aucuparia* and *Cotoneaster*. *P. hispidulus*, Piller (*bidentatus*, Thoms.), is only found in deciduous trees such as *Corylus avellana* and *Carpinus betulus*. *Acanthoderes clavipes*, Schr., is somewhat rare; it was taken from birch that had been lying dead for some years. *Liopus nebulosus*, L., usually occurs under the bark of trees such as *Pyrus*, *Corylus*, *Fagus*, *Prunus*, *Quercus*, etc.; there is probably one generation a year. *Acanthocinus aedilis*, L., is common in pines; it prefers large stems and also lives under the bark of stumps, and it pupates either under the bark or in the sap wood, this latter habit making it economically injurious. *Exocentrus lusitanus*, L., is confined to dead branches of lime, usually associated with *Pogonochaerus hispidus* and *Hoplosia fennica*. *Saperda carcharias*, L., lives in living stems, large branches or large roots of poplar and willow; it probably has a two-year development. *S. populnea*, L., is a widespread and common species usually confined to small living branches of aspen, but sometimes found in other poplars and willows. *S. scalaris*, L., is polyphagous and occurs on oak, birch, fruit-trees, *Sorbus*, poplar and willow; it is only found in dead wood, preferably in large stems. *S. perforata*, Pall., is monophagous and lives under the bark of aspen; it is decidedly a secondary pest and prefers stems that have long been dead. *Stenostola ferrea*, Schr., occurs only in the south of Sweden, and is found in dead branches of lime. *Oberea linearis*, L., is another southern species; it occurs on hazel. *Phytoecia cylindrica*, L., infests Umbelliferae, including carrots (*Daucus carota*); it has a one-year development. *Tetrops praeusta*, Steph., lives in the dead branches of fruit-trees, *Prunus spinosa*, etc.

SPESSIVTSEFF (P.). **Bestämningstabell över svenska barkborrar.** [A Key to the Swedish Bark Beetles.]—*Medd. Stat. Skogsförsöksanst.*, xix, no. 6, pp. 453–492, 74 figs. Stockholm, 1922.

The title of this paper indicates its contents. There is also a list of the beetles arranged according to their principal food-plants.

WEST (L. S.). **Immunity to Parasitism in** *Samia cecropia* **Linn. (Lep.: Saturniidae; Dip.: Tachinidae).**—*Ent. News*, xxxiv, no. 1, pp. 23–25. Philadelphia, Pa., January 1923.

A case is recorded in which a fully grown larva of *Samia cecropia*, bearing about 40 Tachinid eggs upon its body and showing evidence that the parasitic larvae had entered the host, developed normally, the adult dying after laying apparently the usual number of eggs. Whether the case described is one of specific or individual immunity remains undecided.

CUSHMAN (R. A.). U.S. Bur. Ent. **The Identity of** *Ichneumon coccinellae*, **Schrank (Hym.).**—*Proc. Ent. Soc. Wash.*, xxiv, no. 9, pp. 241–242. Washington, D.C., December 1922.

Attention is called to the fact that *Bracon terminatus*, Nees, *Euphorus sculptus*, Cress., and *Perilitus americanus*, Riley, are synonyms of *Dinocampus* (*Ichneumon*) *coccinellae*, Schr.

EHRHORN (E. M.). **Report of Chief Plant Inspector, September 1922.**—*Hawaiian Forester & Agriculturist*, xix, no. 11, pp. 261–262. Honolulu, November 1922.

The pests intercepted in September 1922 included Lepidopterous larvae and the rice weevil [*Calandra oryzae*] in seeds and dried fruits from Madeira, Lepidopterous larvae in dried chestnuts from China, and *Iridomyrmex humilis* (Argentine ant) and *Pheidole* sp. on rose plants from California. The beneficial insects received during the month were parasites of *Pseudococcus bromeliae* and dung beetles.

CORBETT (G. H.). **Preliminary Note on the "Lesser" Coconut Spike Moth.**—*Malayan Agric. Jl.*, x, no. 5, pp. 136–139. Kuala Lumpur, May 1922. [Received 16th January 1923.]

The lesser coconut spike moth is found in Perak and Selangor and is probably distributed throughout Malaya. So far as the author is aware injury by the larvae to the flowers of the inflorescence whilst still enclosed in the spathe has not previously been recorded. It appears to be the principal pest of coconut spikes, as a large number of female flowers are found to be injured before the spikes have opened. The damage caused to the inflorescence at such an early stage may prevent the female flowers from maturing. Larvae have been found on trees which were considered to be bearing well. The damage is chiefly seen on the flowers at the basal half of the spike, though the marks showing where the larvae have entered are usually found on the apical half. Experimentally the eggs were laid on the spathe, generally between the grooves where the tissue at the base is softer than at the surface. The larvae hatch in 2–3 days and feed upon the flowers, this stage lasting 5–8 days. Pupation occurs at the base of the main flower stalk and lasts 6–8 days. From field observations the eggs appear to be laid about 15 days before the spike bursts. In trees carrying three unopened spikes, the youngest spike has not been noticed to be attacked, the middle one showed only slight marks of feeding, while the oldest spike sometimes contained larvae, pupae and adults.

Remedial measures cannot be recommended as yet, but experiments are being made with injection of substances into the spikes, spraying them with poisons, or painting them with probable deterrents to the adults and substances affecting the eggs. Injections of carbon bisulphide appear to cause too much damage to the inflorescences to be recommended. Two other species of moth have been obtained from spikes, one of which has been identified as *Tirathaba* sp. nr. *trichogramma*, Meyr. (greater coconut spike moth).

Miller (D.). **A new Apple-tree Borer,** *Navomorpha sulcatus.—N.Z. Jl. Agric.*, xxv, no. 5, pp. 296–298, 4 figs. Wellington, 20th November 1922.

Twigs and branches of apple and almond trees have become infested with the larvae of the Cerambycid, *Navomorpha sulcata*, F., which first became important in 1921 as a destructive insect attacking *Pinus radiata*. Eggs are laid in small holes in the bark and twigs, and the larvae cut a burrow through the heart wood. As they grow, the burrows increase in size, and the larvae are frequently found making grooves immediately beneath the bark. Young larvae are often found in terminal shoots. When mature the larva blocks its burrow in front and behind with plugs of shredded wood and pupates. The adults emerge about August and work their way to the bark. Branches containing larvae and pupae should be cut and burned before August. If the infested parts are extensive, good results may be obtained by locating the burrows and injecting carbon bisulphide into them and blocking up with clay any neighbouring holes in the bark.

Brittain (W. H.). **Injuries, Life-history and Control of the Apple Sucker (*Psylla mali* Schmidberger).**—*Scientific Agric.*, iii, no. 5, pp. 176-188, 4 tables. Ottawa, January 1923.

The life-history of and the character of injury caused by *Psylla mali*, Schmidb. (apple-sucker) are recorded, together with a summary of the various remedial measures recommended by previous authors. Spraying experiments on potatoes in 1920 indicated that when Bordeaux mixture is applied to plants the foliage of which has become weakened by the attack of sucking insects, serious injury may result. In experiments on orchards, in one that received no treatment the brown and yellow leaves added together aggregated 16 per cent.; another, sprayed twice with Bordeaux mixture and calcium arsenate, exhibited 36 per cent. injury, showing that application of Bordeaux mixture to injured foliage tends to increase the damage; in another orchard, sprayed twice with Bordeaux mixture and calcium arsenate, nicotine sulphate being added to the second spray, 13 per cent. injury occurred, showing that nicotine sulphate, though only applied after the blossom petals fell, prevented serious harm from insects and in two other orchards sprayed with Bordeaux mixture and calcium arsenate, and with copper-lime-arsenate dust respectively, the applications were clearly injurious. Owing to the high cost of nicotine sulphate this material has not generally been used in regular sprays, liquid Bordeaux or copper-lime-arsenate dust being the materials most commonly used.

Knowles (C. H.). **The Small Leaf Moth of Coconuts in Fiji (*Levuana iridescens*, Bethune-Baker).**—*Fiji Dept. Agric.*, Bull. 12, 8 pp., 1 plate. Suva, 1919. [Received 18th January 1923.]

This is a summary of the life-history and habits of *Levuana iridescens*, B.B., together with a list of its natural enemies, and particulars of measures for its control.

NONELL COMAS (J.). **Los insectos entomófagos. Utilización de la Coccinela, *Novius cardinalis*, en lucha natural contra la Codunilla Australiana, *Icerya purchasi* (Maskell), en España.** [Entomophagous Insects. The Use of the Coccinellid, *N. cardinalis*, against the Australian Scale, *I. purchasi*.]—*Rev. Inst. Agríc. Catalán S. Isidro*, lxxi, no. 12, pp. 211–213. Barcelona, December 1922.

In 1913 and 1914 a study was made of *Apanteles glomeratus* and *Pteromalus puparum* as natural enemies of the cabbage butterfly [*Pieris brassicae*], which is no longer a dangerous pest in Spain owing to the control exercised by these parasites. At the present time measures are being taken to distribute *Novius cardinalis* in the districts where *Icerya purchasi*, Mask., has appeared. Spraying has been tried against this scale, but the results are unsatisfactory.

DE JONG (W. H.) & ELZE (D. L.). **Over Emelten.** [On Tipulid Larvae.]—*Verslagen & Meded. Plantenziektenk. Dienst*, no. 28, 40 pp., 7 figs., 4 plates. Wageningen, December 1922.

In view of the economic importance of Tipulid larvae in Holland and of the scanty information available regarding them, a special investigation was made during 1920–22. This paper embodies the results obtained and contains many references to existing literature. The larvae are most abundant and injurious in March and April. It is probable that in Holland *Tipula paludosa*, Mg., is the species that frequently increases to such an extent as to cause serious damage. *T. oleracea*, L., is a closely allied species recorded as injurious in European literature. In 1873, in an exceptional instance, *Pachyrrhina maculosa*, Mg., occurred in enormous numbers. In view of the confusion between *T. paludosa* and *T. oleracea*, the author draws attention to small differences in the hypopygium and to the difference in the flight periods of these species in Holland. *T. oleracea* is on the wing in May and June and again in late summer, while *T. paludosa* flies in late summer, it being exceptional for individuals to be taken earlier. It is an open question, however, whether *T. paludosa* should not be treated as a variety of *T. oleracea*, but for the present the former name is used for the species of importance in Holland. In 1920 and 1922 the chief flight period occurred in the first half of September, while in 1921—a very dry year—it took place in the latter half of the same month.

A brief account is given of the adult, egg and larval stages of *T. paludosa*. There is a great mortality in the first weeks of larval life, dry weather being especially injurious. During the autumn the larvae live near the surface of the ground ; it is not known whether they go deeper in winter. They resist frost, and individuals thawed out of ice seemed quite unharmed. With the increase in warmth in March the larvae revive. The injury they do to living plants in autumn is of little consequence, but in March and April considerable harm may result. In spring they are quite near to or even on the surface. Occasionally the larvae migrate from one place to another, and this is done by night over the ground. Some individuals may be seen still on the surface in the morning. Early in May the larvae go deeper down, and the surface migrations stop, but may recur for a time if it rains. The larvae require to find their food within a small radius ; this is possible in grass land, but is difficult in fields with summer crops. About the end of August the larvae pupate in

their galleries, and the adults emerge 8–14 days later. On meadow-land the larvae do not wander far in spring. By digging parallel trenches at a distance of 15 ft. from one another in mid-April it is possible to catch 60 per cent. of them during the second half of April. If the trenches are dug early in May about 15 per cent. will be taken in the first half of the month.

There are many factors influencing abundance of larvae. Drought destroys large numbers; flooding may prove fatal, but in winter the almost total suspension of the vital functions confers great powers of resistance to asphyxiation. Storms disperse and injure the adults, but heavy rain alone does them little harm. Natural enemies include beetles, spiders, shrews, Dipterous parasites (*Bucentes geniculata*, DeG.), moles, rooks and crows. These help in preventing the occurrence of an outbreak, but cannot terminate an existing one.

The lands most infested by Tipulids are heather areas cleared for pasture, probably owing to the absence of natural enemies and to the spongy turf in such land, which facilitates oviposition.

The measures to be taken include keeping the land ploughed; encouraging moles, crows, etc.; rolling and dragging when many ovipositing females are present; and the use of the "furrowing wheel" [*R.A.E.*, A, x, 428]. Another apparatus that may prove very efficient if modified and made stronger consists of a frame with a mass of vertical needles for pricking the infested ground. On cultivated land the poison bait used in California [*R.A.E.*, A, ix, 576] may be tried.

BONDAR (G.). **Insectos damninhos e molestias do coqueiro** (*Cocos nucifera*) **no Brasil.** [Insect Pests and Diseases of the Coconut in Brazil.]—113 pp., 73 figs. Bahia, 1922.

Rhynchophorus palmarum generally feeds on dead material, but frequently attacks healthy palms. Infestation usually occurs in young plants before the trunk is completely formed. All stages occur throughout the year. It has other food-plants, and recently felled trunks of *Jacaratia dodecaphylla* are very attractive to the adults. Insecticides that kill the larva *in situ* are injurious to the palm, and the trapping of the adults in decaying palm trunks seems to be the best method. *R. politus*, Gyll., attacks *Cocos schizophylla*, but not the coconut. A Curculionid, *Rhina barbirostris*, F., oviposits in the bark, preferably in wounds or in cavities made by another weevil, *Homalonotus coriaceus*. The egg is covered with a dark substance so that it resembles a scale such as *Aspidiotus*. The larva works to the centre of the trunk and back to the periphery, where it pupates just beneath the surface. Sometimes the wind breaks the trunks where they are weakened by the bore-holes, but usually infestation only results in a greatly diminished yield of nuts. Though all stages occur throughout the year, it is in summer from October onwards that *R. barbirostris* is most abundant and that oviposition chiefly takes place. According to Costa Lima *R. affaber* from Mexico and *R. costalis* from Brazil are forms of *R. barbirostris*. This weevil is thus distributed throughout tropical America. In Bahia and S. Paulo palms with trunks sheathed in leaves are not attacked. A fungus destroys many larvae, and Tachinid flies attack the pupae. The larvae may be killed *in situ* with a wire or with carbon bisulphide, and the escape of the adults may be prevented by binding copper gauze of 3 mm. mesh round the trunks. All infested crownless trunks must be burned.

Homalonotus coriaceus, Gyll., reduces the yield of nuts. The adult feeds in the unopened flowers and newly formed fruits. The female also oviposits in the floral bract on the tissues of which the larva feeds, afterwards pupating in the base of the bracteal cavity. When infestation is heavy the weevil also feeds and oviposits in the leaf-petioles—as it does in immature palms—and the larva, having fed in the petiole, passes into the trunk. *H. coriaceus* does not readily fly and can fast for 4–5 weeks. It probably infests coconuts throughout Brazil. The collection of the adults and the destruction of the larvae in dead or damaged inflorescences are advised. *H. deplanatus*, Sahlb., attacks *Cocos romanzoffiana* in S. Paulo and probably the coconut as well. *Amerrhinus ynca*, Sahlb., is another weevil injuring the petiole and the leaf-axillae. Two Scolytids, *Xyleborus affinis*, Eichh., and *X. torquatus*, Eichh., also bore in the trunk and leaf-petioles, the larvae developing in the mines made by the adult females.

Pests of the leaves include several Chrysomelid beetles. *Mecistomela corallina*, Vigors, infests *Cocos* spp., being usually found on quite young plants putting forth their first leaves. The adult feeds on the parenchyma and oviposits on the leaves and leaf-petioles. An egg is laid every week or two. The larva hatches in 22–29 days, and feeds on the tender leaves, living hidden in the developing leaf or in the axillae of new leaves. It pupates in the axillae of lower leaves, and after a month the adult emerges. *M. marginata*, Latr., does similar damage, and *M. quadrimaculata*, Guér., occurs in the south of Brazil, in Paraguay and Argentina. The best way of saving the young plants is the removal of the adults and larvae with tweezers. As the beetles are not prolific and require about 6 months to complete their life-cycle, this operation every 3–4 months should suffice. The larvae and adults of another Chrysomelid, *Delocrania cossyphoides*, Guér., feed on the lower leaf-surface, especially of young plants shielded from the wind. *Porphyraspis tristis*, Boh., does similar damage. *Bravicolaspis villosa*, Bryant, is only known from the adult, which feeds on the inner tissue of the leaf. The larvae and adults of a beetle [probably *Eurypus rubens*, Kby.], which live in the leaf-axilla, are not really injurious. A Buprestid, *Taphrocerus cocois*, sp. n., may be included among the borers, as the larva lives in the plant tissue. The eggs are laid on the leaves. The adults occur throughout the year. More than 50 per cent. of the larvae are destroyed by a Hymenopterous parasite.

Of the two families of Lepidoptera attacking the leaves Brassolids are more numerous than Limacodids. Of the former, *Opsiphanes invirae*, God., is the commonest. It is only important if young palms are attacked.

Of the Rhynchota various Fulgorids and Pentatomids cause insignificant damage. The following Coccids have been recorded:—*Aspidiotus destructor*, Sign., *A. lataniae*, Sign., *Asterolecanium lineare*, L., *Chrysomphalus aonidum*, L., *Ceroplastes actiniformis*, Green, *Fiorinia fioriniae*, Targ., *Hemichionaspis aspidistrae*, Sign., *H. minor*, Mask., *Ischnaspis longirostris*, Sign., *Pinnaspis buxi*, Bch., and *Vinsonia stellifera*, Westw. Of these *A. destructor* is the most dangerous and abundant. If coconuts for planting are likely to be infested, they should be dipped for a few minutes in kerosene emulsion.

The Aleurodids infesting the coconut are not of economic importance. The following species are briefly described:—*Quaintancius rubrus*, sp. n., *Radialeurodicus asymmetrus*, sp. n., *R. cinereus*, sp. n., *Aleurodicus*

bifasciatus, sp. n., *Paraleurodes crateraformans*, sp. n., *Pentaleurodicus induratus*, Hemp., *Aleurodicus flavus*, Hemp., *Aleurotrachelus atratus*, Hemp., and *A. stellatus*, Hemp.

Some Orthoptera may do considerable damage, especially to young palms. The principal species is *Tropidacris grandis*, which is best dealt with by collection in early morning. Termites are responsible for some damage, and their nests should be destroyed.

Nuts that have fallen prematurely often bear at the base traces of injury by the larva of *Harpagoneura complena*, Boisd., which lives in the leaves ensheathing the base of the nut and penetrates into the latter. This moth is responsible for similar injury in Australia. A Bruchid, *Pachymerus* (*Bruchus*) *nucleorum*, is said to occur inside the nut, but the author has not met with it in the coconut, having noticed it only in *Elaeis guineensis* and *Cocos schizophylla*.

DRAGHETTI (A.). **Unidentified Dipteron on Lucerne in Italy.**—*L'Italia agricola*, lix, no. 3, pp. 82-83. Piacenza, 15th March 1922. (Abstract in *Internat. Rev. Sci. & Pract. Agric.*, xiii, no. 7, p. 922. Rome, July 1922.) [Received 20th January 1923.]

The examination of deformed inflorescences noticed on lucerne in Italy in 1920 and 1921 showed that the damage is due to a gall-forming insect that changes the flowers into actual galls. The author believes the agent to be *Cecidomyia loti*, a midge that injures the flowers of lotus, or a species very similar to it. In the case of lucerne the attack coincides with the appearance of the first flowers of the May and June-July crop, but hypertrophied flowers are also to be found in the subsequent crops. The damage may also affect a small proportion of normal flowers, resulting in a decreased quantity and an inferior quality of seed.

MATUS (M. D.). **El pulgon de los manzanos** (*Schizoneura lanigera*, **Hausm.**). **Su destruccion por medio de la lucha biologica con el** *Aphelinus mali* (**Hald.**). **Experimentaciones realizadas por el Instituto biologico de la Sociedad Rural Argentina.** [The Woolly Apple Aphis, *Eriosoma lanigerum*. Its Destruction by means of *A. mali*. Experiments made by the Biological Institute of the Sociedad Rural Argentina.]—*An. Soc. Rur. Argentina*, lvi, no. 24, pp. 720-723, 2 figs. Buenos Aires, 15th December 1922.

The title of this paper indicates its contents. The prospects of the establishment of *Aphelinus mali*, Hald., in Argentina seem very promising.

MATUS (M. D.). **Consideraciones sobre el cultivo del manzano. Un nuevo método de lucha contra el pulgon.** [Notes on Apple Growing. A new Method for combating the Woolly Aphis.]—*Gaceta Rural*, xvi, no. 185, pp. 463-467. Buenos Aires, December 1922.

The contents of this article are substantially the same as those of the preceding paper.

LEHMANN (H.). **Veraltete und neuzeitliche Bekämpfung der Obstmade** (*Carpocapsa pomonella*). [Obsolete and Modern Methods against *Cydia pomonella*.]—20 pp., 7 figs. Stettin-Neutorney, Verlag Kleintierzucht & Gartenbau, 1922.

This pamphlet reviews the various methods employed against *Cydia pomonella*.

LEHMANN (H.). **Steigerung der Obsternte durch wirtschaftliche Schädlingsbekämpfung.** [The Increase of the Fruit Harvest by Economic Control of Pests.]—32 pp., 32 figs. Frankfort-on-the-Oder, Verlag Trowitzsch & Sohn G. m. b. H., 1923.

This little work gives instructions for safeguarding fruit crops against insect pests in Germany.

LEHMANN (H.). **Neue Versuche zur wirtschaftlichen Bekämpfung des Apfelwicklers.** [New Experiments in the Economic Control of *Cydia pomonella*.]—*Deutsche Obstbauztg.*, 1922, no. 48, pp. 427–430. Leipsic, 22nd December 1922.

As a result of experiments in 1922 the author makes the following recommendations for combating *Cydia* (*Carpocapsa*) *pomonella*. Urania green is the best arsenical for spraying, and infestation is considerably diminished if this operation is properly carried out. The minimum amount of the arsenical is 1 lb. to 125 gals. water (80 gm. to 100 litres). This minimum quantity should be used for pear trees, but $1\frac{1}{2}$ lb. is recommended for apples.

KAISER (P.). **Die Lappenrüsselkäfer** (*Otiorrhynchus*) **als Obstbaumschädlinge.** [*Otiorrhynchus* spp. as Pests of Fruit Trees.]—*Deutsche Obstbauztg.*, 1922, no. 48, pp. 431–432. Leipsic, 22nd December 1922.

Otiorrhynchus raucus appears in May and oviposits in freshly dug ground in orchards. The larvae feed on the roots of the trees. They pupate in July, and the weevils appear in August and September and either remain underground and hibernate there or emerge and begin feeding on the leaves until winter approaches. Early in spring they emerge and attack the buds, leaves and flowers, and gnaw the bark of young twigs. If they are abundant, young trees may be killed. Banding may be applied early in May; the ground should be hoed in June and kainit may be dug in; the trees may be jarred in the early morning; and spraying with an arsenical is also a useful measure. Grafted plants may be protected by painting with clay. Similar damage is done by *O. picipes*, F., a less abundant weevil.

KAISER (P.). **Der ungleiche Holzbohrer—ungleicher Borkenkäfer,** *Tomicus* (*Xyleborus*) *dispar*.—*Deutsche Obstbauztg.*, 1922, no. 48, p. 432. Leipsic, 22nd December 1922.

Xyleborus dispar attacks all fruit trees, but especially pip fruits, and particularly the apple. Immediate measures are necessary when infestation is noticed. The first brood adults fly in April and May, and those of the second, in June and August, after which they hibernate in their mines. To prevent attack the trees should be painted with carbolineum mixed with clay or cow-dung before the flight periods. Carbon bisulphide may be applied to the holes, which are then sealed.

Watson (J. R.). **On a Collection of Thysanoptera from Rabun County, Georgia.**—*Florida Ent.*, vi, no. 3, pp. 34–39 & 47–48. Gainesville, Fla., December 1922.

The 23 species of Thysanoptera here recorded include *Frankliniella tenuicornis*, Uzel, on grass, recorded for the first time from America; *Thrips crenatus*, sp. n., on *Lespedeza*, pine and bitterweed (*Helenium tenuifolium*); *Heterothrips auranticornis*, sp. n., on *Helenium*; *Haplothrips rabuni*, on grasses and sedges; *H. augustipennis*, on coarse marsh grasses; and *Hoplandrothrips flavoantennis*, Wats., the male of which is now described, on oak.

Watson (J. R.). *Hymenorus obscurus* **as a Pest of Citrus (Col. Cistelidae).**—*Florida Ent.*, vi, no. 3, p. 43. Gainesville, Fla., December 1922.

Hymenorus obscurus, though usually feeding on lichens and other growths on the bark of the trees, must be considered as a minor pest of *Citrus*, as it is now recorded as feeding on the tender growth of these trees in Florida. In confinement it feeds greedily on tender citrus foliage. It must not be confused with the Tenebrionid, *Epitragus tomentosus*, which it greatly resembles in shape and colour though not in habits, the former being one of the most beneficial insects in citrus groves.

Mason (A. C.). **A New Citrus Insect.**—*Florida Ent.*, vi, no. 3, pp.43-44. Gainesville, Fla., December 1922.

The larva of *Prodenia latifascia*, Wlk., has been found feeding on the leaves of a young grapefruit tree in Florida. The only previous record from the United States is on onions and lucerne in Texas. It is essentially a tropical moth found from Mexico to Argentina, including Jamaica, Cuba, Haiti and St. Lucia.

Stirling (F.). **The Psocid of the Oaks.**—*Florida Ent.*, vi, no. 3, p. 44. Gainesville, Fla., December 1922.

A species of *Psocus* is found under the silky silver-grey web which may completely cover the larger limbs and trunks of water oak in Florida, Louisiana and Alabama. It is a beneficial insect as it feeds on fungus growths and lichens, the web being a protection against birds and other enemies.

Watson (J. R.). **A New Thrips from Citrus in Alabama.**—*Florida Ent.*, vi, no. 3, p. 45. Gainesville, Fla., December 1922.

The female of *Haplothrips harnedi*, sp. n., is described from Southern Mississippi [*sic*] on citrus trees.

Cartwright (W. B.). U.S. Bur. Ent. **Sexual Attraction of the Female Hessian Fly** (*Phytophaga destructor*, **Say**).—*Canadian Ent.*, liv, no. 7, pp. 154–155. Orillia, Ont., July 1922. [Received 23rd January 1923.]

The results of these experiments show that an average of 145 males were attracted to each female of *Mayetiola* (*Phytophaga*) *destructor*, Say, the zone of attraction being most marked at from one to six feet, though the males were apparently attracted within 15 feet and definitely so within 10 feet.

ROHWER (S. A.). U.S. Bur. Ent. **A New Parasite of the Spruce Budworm (Hym.).**—*Canadian Ent.*, liv, no. 7, pp. 155–156. Orillia, Ont., July 1922.

Phytodictus fumiferanae, sp. n., has been reared from cocoons of *Tortrix fumiferana*, Clemens (spruce budworm) in British Columbia.

FERRIS (G. F.). **Notes on Coccidae IX. (Hemiptera).**—*Canadian Ent.*, liv, no. 7, pp. 156–161, 4 figs. Orillia, Ont., July 1922.

The anatomy of *Takahashia japonica*, Ckll., *T. jaliscensis*, Ckll., and *Pseudophilippia quaintancei*, Ckll., is discussed. *Cryptostigma ingae*, gen. et sp. n., is described from Porto Rico on *Inga laurina*. This species occurs inside the hollow twigs and is attended by ants.

FARRELL (F. D.). **The Work of the Kansas Agricultural Experiment Station during the Biennium ending June 30, 1922.**—45 pp., 4 figs. Manhattan, Kan., November 1922.

On pages 20–21 of this report, the results of field experiments on the resistance of varieties of wheat to injury by Hessian fly [*Mayetiola destructor*, Say] are summarised. There is practically no discrimination by the adults in ovipositing on the various varieties, but there is a decided difference in the subsequent infestation. Some varieties were apparently resistant in one test and susceptible in another, and there is also a marked difference in the behaviour of various strains of the same variety. The resistance of the plant is apparently not associated with morphological characters, but the silica content may have a decided influence on the ability of the plant to resist injury.

MARLATT (C. L.). **Report of the Federal Horticultural Board [1921–22].**—*U.S. Dept. Agric., Fed. Hortic. Bd.*, 26 pp. Washington, D.C., 1922.

The situation respecting the work of eradicating the pink bollworm [*Platyedra gossypiella*] is now better than ever before, but inspection and field work are still more necessary if ultimate success is to be gained. The past efforts have probably resulted in the protection of the cotton crop of the entire South. Louisiana and Eastern Texas are now possibly free from this pest, but in Western Texas it occurs sporadically, though it involves little greater risk than occurs from its presence in Mexico. The scouting and clearing operations for 1921 and the federal participation in compensation to farmers is briefly noticed. Research work on the bollworm in Mexico has shown that it cannot as a rule survive in moist soil. In infested bolls, so buried, 95–99 per cent. of the larvae perish. Work on the prevention of the entry of this pest from Mexico is being continued. The only new outbreaks in 1921 in Northern Texas, the progress in disinfection of cotton seed, and the account of the survey to determine the present distribution of the bollworm in the West Indies, have already been recorded [*R.A.E.*, A, x, 539, 595].

The corn borer [*Pyrausta nubilalis*] is still limited substantially to the areas determined last year. It would appear that quarantine and other measures have prevented the spread of this moth, and it is important that the work should be continued.

The Japanese beetle [*Popillia japonica*] is still limited to the original area of infestation except for the natural spread of some five miles a year. It is one of the most dangerous pests introduced for many years. During 1921 from some 200,000 baskets of sweet maize moved out of the district upward of 5,000 beetles were removed. There is no question but that this pest will eventually spread throughout the United States, so that measures against it are of immediate value as they give time for its bionomics to be studied and afford opportunity for the introduction of natural enemies.

Quarantine on account of gipsy moth [*Porthetria dispar*] and brown-tail moth [*Nygmia phaeorrhoea*] has been twice slightly modified during the year [*R.A.E.*, A, xi, 40]. The date scale [*Parlatoria blanchardi*] is so destructive that dates cannot be grown profitably until it is completely eradicated and rapid progress has been made in endeavours to exterminate it.

A list of the current quarantine and other restrictive orders is given.

Leiby (R. W.). **The Polyembryonic Development of** *Copidosoma gelechiae* **with notes on its Biology.**—*Jl. Morphology*, xxxvii, no. 1, pp. 195–285, 18 plates. Philadelphia, Pa., December 1922.

The Encyrtid, *Copidosoma gelechiae*, How., is a primary polyembryonic parasite of the moth, *Gnorimoschema gallaesolidaginis*, Riley, the larva of which forms galls on the stems of golden rod [*Solidago*]. A detailed account is given of its development.

Aldrich (J. M.). **The neotropical Muscoid genus,** *Mesembrinella*, **Giglio-Tos, and other testaceous Muscoid flies.**—*Proc. U.S. Nat. Mus.*, lxii, no. 2457, art. 11, pp. 1–24. Washington, D.C., 1922.

This paper includes a key to the genus *Palpostoma* and records *P. testacea*, R.-D., and *P. desvoidyi*, sp. n., as reared from *Lepidoderma albohirtum* and *Lepidiota frenchi* respectively. These Melolonthid beetles are injurious to sugar-cane in Northern Queensland.

Fisher (W. S.). U.S. Bur. Ent. **The Leaf and Twig Mining Buprestid Beetles of Mexico and Central America.**—*Proc. U.S. Nat. Mus.*, lxii, no. 2454, art. 8, pp. 1 95. Washington, D.C., 1922. [Received 25th January 1923.]

Of the Tribes Agrilini and Mastogenini, 9 genera and 111 species have been previously described from this area, and the number is here increased to 10 genera and 153 species. Keys are given to the genera and species concerned.

Lee (S.). **Swanley District and Winter Moth.**—*Bull. Chamb. Hortic.*, i, pt. 3, pp. 47–48. London, January 1923.

The winter moth [*Cheimatobia brumata*] is reported as unusually abundant in parts of Kent, and a considerable outbreak of the caterpillars is anticipated in the spring.

Smith (K. M.). **Control of the Onion Fly. A short account of some further trials.**—*Bull. Chamb. Hortic.*, i, pt. 3, pp. 54–55. London, January 1923.

Further experiments for the control of *Hylemyia antiqua* (onion fly) are described [*R.A.E.*, A, x, 49]. Precipitated chalk was used as a carrier for tar oils and was found much more satisfactory. One part

by weight of the chemical was used to 99 parts by weight of chalk. It is important that these proportions are not exceeded or damage to the plant will result. Naphthylamine gave the best results, but is too expensive for practical use. The next best were green tar oil, chlorcresylic acid, light cresylic acid and paraffin emulsion (4 pts. paraffin, 1¼ lb. soft soap and 10 gals. water). Plots treated with heavy cresylic acid, nitro-benzine, and resin soap, 1 oz. of the latter being dissolved in 2 gals. water, with the addition of a little sodium carbonate, yielded only moderately good crops. Experiments with 1 oz. corrosive sublimate dissolved in 10 gals. water, about a cupful to each plant, were inconclusive. These substances should be applied in early spring, when the onions are still small, and repeated at intervals of two or three weeks. Liberal applications of nitrates or some artificial stimulant should be given to the plants, and fresh manures avoided. Onions should not be grown on ground infested the previous year.

Weiss (H. B.). **Work against the Gipsy Moth in New Jersey.**—*New Jersey Dept. Agric. Bur. Statistics & Inspec.*, Circ. 56, 23 pp., 13 figs. Trenton, N.J., August 1922.

The information in this circular on the gipsy moth, *Porthetria dispar*, is practically identical with that in one already noticed [*R.A.E.*, A, ix, 461].

Fletcher (T. B.). **List of Publications on Indian Entomology, 1920-21.**—*Pusa Agric. Res. Inst.*, Bull. 139, 67 pp. Calcutta, 1922.

This useful and annotated list is arranged under the authors.

Beeson (C. F. C.). **Damage to Timber by Insects.**—*Indian Forest Records*, ix, pt. 5, pp. 81-91. Delhi, 1922. [Received 30th January 1923.]

The liability of a given species of tree to attack by borers is influenced by several factors, of which locality, date of felling and girdling, and treatment of logs after felling are the most important. The distribution of borers that are economic pests is not necessarily coincident with the distribution of trees attacked, and consequently a method of seasoning applicable to one locality is not necessarily reliable for another. The life-cycles of borers vary greatly in different groups. The date on which a tree is felled affects its liability to damage in so far that it is likely to be attacked first by those species swarming at or shortly after the date of felling. Trees felled in the rains and cold weather are attacked by shot-hole borers (*e.g.*, *Diapus furtivus*), whereas those felled from March to June escape. Trees felled in the hot weather are likely to be attacked by small Longicorns (*e.g.*, *Dialeges pauper*, *Diorthus cinereus* and *Aeolesthes holosericea*), but less so in March and April, when the prevalent borers would be *Xylotrechus smei* and *Sphaerotrypes siwalikensis*, species of no economic importance. The most favourable time to fell sal [*Shorea robusta*] in order to ensure the least damage by borers is in March and April. In general, girdling at the commencement of the hot weather, if it produces rapid death and drying-out of the bark, confers immunity, while girdling at the beginning of the rains, unless the tree survives till the cold weather, presents the most dangerous conditions. The most favourable dates for felling and girdling require to be worked out by experiment for

different localities. The treatment of logs after felling is a factor that works independently of the foregoing conditions, and possibly admits of more practical utilisation. Unless the bark is present on the log, borers of certain groups are unable to establish themselves. Damage can be avoided by complete submergence in water during the dangerous periods of the year and by exposure to sunlight with frequent turning of the logs. Green conversion with or without previous removal of the bark confers immunity from attack of the groups above-mentioned provided the conversion is within a week or two of felling. Except for the few instances of dry-wood borers, it may generally be stated that green conversion supplies the best method of preventing damage by borers, and that the subsequent treatment by vertical or horizontal stacking, immersion in water, shading or sun-drying scarcely affects the question of further damage. A table is given of the different groups of boring insects commonly breeding in the more refractory timbers, and it also illustrates the variety of causes of damage and the range of susceptibility of timbers. Any remedies must be based on special entomological investigations aimed at the determination of the biology of the borers concerned. The solution of the problem lies in the fixation of the correct dates for felling and girdling or of periods during which exploitation is safe. These dates are likely to vary from locality to locality. A classification of the different types of damage caused by boring insects in India, the conditions under which the borers work, and their names are given.

Escherich (K.). **Die Stellung der angewandten Entomologie im Pflanzenschutz.** [The Position of Applied Entomology in Plant Protection Work.]—*Verh. Deutsch. Ges. angew. Ent. 3. Mitgliederversammlung zu Eisenach 28. bis 30. September 1921*, pp. 17–22. Berlin, 1922. [Received 26th January 1923.]

The author considers that in Germany research work on plant pests and practical plant protection service should be kept quite separate. The research work should be divided into zoological and botanical sections, though the staff engaged in practical service should be instructed in both. To improve the status of plant protection research separate professorships of applied zoology and applied botany should be created. These desiderata have already been fulfilled in the case of forestry.

Börner (C.). **Ueber Fernflüge von Blattläusen nach Beobachtungen auf Memmert und Helgoland.** [Long-Distance Flights of Aphids as observed on Memmert and Heligoland.]—*Verh. Deutsch. Ges. angew. Ent. 3. Mitgliederversammlung zu Eisenach 28. bis 30. September 1921*, pp. 27–35. Berlin, 1922. [Received 26th January 1923.]

The East Frisian Islands on the German North Sea coast, especially those with a scanty flora or with few cultivated fruits, provide a means for studying the powers of flight of Aphids and other small insects.

One of these is Memmert, an island recently formed semi-artificially, about 14 miles from the coast of Holland and the same or less distances from other islands of the group. The observations were made in May and August 1921. Special attention was paid to such wild plants as are summer food-plants of those Aphids the winter food-plants of

which do not occur on Memmert or on the nearest of the other islands, such as *Rumex*, *Atriplex*, *Chenopodium*, *Cirsium*, etc. On 25th May no migratory Aphids were found, and the prevalent east wind was unfavourable to flight from the mainland, where several species of Aphids had just begun their spring migration. On 26th May the wind blew from the south and brought over migrants of various species, including *Anuraphis* (*Brachycaudus*) *helichrysi*, common on plum on the coast. At first the newly-arrived Aphids were seen also on plants other than their food-plants, but later on the majority had sought out the latter and had begun reproduction. The following species were observed :—*Macrosiphum tetrarhodum* (*dirhodum*), *M. granarium*, *Siphonaphis padi* (*Aphis avenae* and *A. padi*) on grasses ; *Myzus crataegi* on *Mentha* ; *Rhopalosiphum ribis* on *Sonchus* ; *Siphonaphis* (*A.*) *nymphaeae* on *Typha*, *Hyalopterus arundinis* (*pruni*) on *Phragmites*, and *Anuraphis helichrysi* (*Brachycaudus pruni* and *B. helichrysi*) on *Cirsium*, etc. The newly-hatched individuals appeared in 12–14 days and began to reproduce themselves. *S. nymphaeae*, of which only one specimen was seen, perished. In no case did alate individuals occur in the first parthenogenetic generation. These Aphids must have been brought from the mainland, a distance of at least 15 miles, or farther if they came from inland districts. There were no signs of their previous presence in Memmert. As such large numbers reached this small island, it is evident that myriads must have been blown out to sea. The delicate nature of the bodies of Aphids excludes any possibility of their having floated to the island. Some migratory species can find in Memmert all the food-plants they need. For instance, *Myzoides mollugimis* was established there, and *Pterochlorus viminalis* (*Siphocoryne salicis*) and *S. umbellatarum* transfer from willows to Umbelliferae. *Vacuna dryophila* and *Pterochlorus* (*Lachnus*) *roboris* perished because they found no food-plants on the island. Contrary to expectation, in May *Conium maculatum* was free from *Siphocoryne xylostei* (a migratory species) and *Epilobium hirsutum* from *Aphis epilobii*, which permanently infests this plant. During the August visit both Aphids abounded on their respective food-plants, so that they must have been conveyed to Memmert in the meanwhile. In August, also, the author found the summer forms of *Aphis viburnicola* and *Anoecia corni*, and as neither snowball [*Viburnum*] nor dog-wood [*Cornus*] occur in Memmert, these Aphids must have been immigrants.

Being convinced that Aphids can be carried at least 15 miles by the wind, the author endeavoured to ascertain if they can travel longer distances. Heligoland is the only island off the German coast that is suitable for such observations, and investigations there proved that conveyance of Aphids from the mainland, a distance of 39 miles, is possible. Heligoland has more woody plants than Memmert, and thus possesses more indigenous Aphids, including *A. philadelphi*, *A. rumicis* (*euonymi*), *A. farfarae* and *A. malifoliae*. *Anuraphis helichrysi* occurs on thistles and similar summer-plants, but as galls were not noticed on plum trees, it is assumed that the Aphids were brought over in spring. This applies also to *Tetraneura ulmi*, the parthenogenetic forms of which occurred on grass roots, though leaf-galls were lacking on elms. *Anoecia corni* must have also been brought over, as dogwood [*Cornus sanguinea*] does not occur in Heligoland. *Rhopalosiphum* (*Myzus*) *hippophaes* is another conveyed species, as *Polygonum persicaria* in Heligoland was quite free from infestation. *M. similis* strongly infested the only patch of coltsfoot on the island.

Wind carriage must also occur in the case of other small insects, and the author found *Aleurochiton aceris* on maple in Heligoland. On the other hand, insects that cannot fly, such as female Coccids, seem to be entirely absent from the North Sea islands visited.

HEERDT (—). **Die Anwendung von Cyanderivaten in der Schädlingsbekämpfung.** [The Use of Derivatives of Hydrocyanic Acid Gas in combating Pests.]—*Verh. Deutsch. Ges. angew. Ent. 3. Mitgliederversammlung zu Eisenach 28. bis 30. September 1921*, pp. 35-37. Berlin 1922. [Received 26th January 1923.]

This paper draws attention to the value for fumigation purposes of such derivatives of hydrocyanic acid gas as "Zyklon" [*R.A.E.*, A, xi, 14], the irritant nature of which is a safeguard. Chemicals of the cyanogen group merit further attention in this connection.

WÜLKER (G.). **Die Parasiten und Feinde des grossen braunen Rüsselkäfers.** [The Parasites and Enemies of the large Brown Weevil.] —*Verh. Deutsch. Ges. angew. Ent. 3. Mitgliederversammlung zu Eisenach 28. bis 30. September 1921*, pp. 37-40. Berlin, 1922. [Received 26th January 1923.]

The information here given on *Hylobius abietis*, L., is substantially the same as that already noticed [*R.A.E.*, A, x, 498].

BLUNCK (H.). **Ueber die Wirkung arsenhaltiger Gifte auf Oelfruchtschädlinge nach Beobachtungen an der Naumburger Zweigstelle der Biologischen Reichsanstalt.** [The Action of Arsenical Poisons on Pests of Oil Crops as observed at the Naumburg Branch of the Imperial Biological Institute.]—*Verh. Deutsch. Ges. angew. Ent. 3. Mitgliederversammlung zu Eisenach 28. bis 30. September 1921*, pp. 40-55. Berlin, 1922. [Received 26th January 1923.]

In 1920 and 1921 the author and other workers investigated the effect of most of the available arsenical poisons in connection with the following pests:—cabbage flea-beetles [*Phyllotreta* spp.], the rape flea-beetle (*Psylliodes chrysocephala*), the rape beetle [*Meligethes aeneus*] and the cabbage shoot weevil (*Ceuthorrhynchus assimilis*). Details of the various experiments are given. For the present, arsenical preparations are not considered suitable for combating these pests. It is doubtful whether sprays will be used in large-scale work against flea-beetles or *M. aeneus*. Dust preparations seem to have more chances of success.

Nicotine sprays give fair results against flea-beetles, against which shade and frequent watering are useful measures on a small scale. *M. aeneus* is still best combated by collection, a method that is also effective against *C. assimilis*.

ZACHER (F.). **Eingeschleppte Vorratsschädlinge.** [Imported Pests of Stored Products.]—*Verh. Deutsch. Ges. angew. Ent. 3. Mitgliederversammlung zu Eisenach 28. bis 30. September 1921*, pp. 55-59. Berlin, 1922. [Received 26th January 1923.]

The pests found in 1921 in grain from foreign sources stored in Germany included the following pests not yet established in the country:—*Palorus depressus, Latheticus oryzae, Rhizopertha dominica, Calandra oryzae* var. *platensis, Caulophilus latinasus, Trogoderma*

khapra, *Carpophilus* sp., a bug allied to *Triphleps*, and *Sitotroga cerealella*. *Bruchus obtectus* and a bean beetle of the genus *Spermophagus* occurred in stored pulses. A beetle closely related to *Ptinus fectus* has recently reached Germany and is now established there.

ZACHER (F.). **Biologie, wirtschaftliche Bedeutung und Bekämpfung der Spinnmilben.** [The Biology, Economic Importance and Control of Spinning Mites.]—*Verh. Deutsch. Ges. angew. Ent. 3. Mitgliederversammlung zu Eisenach 28. bis 30. September 1921.* Berlin, 1922, pp. 59-64. [Received 26th January 1923.]

The following Tetranychid mites are pests in Germany :—*Caligonus* spp. on beech, willow, etc.; *Tenuipalpus* spp. on willow, conifers, etc., and in greenhouses; *Bryobia praetiosa*, one race of which has only one annual generation as a gooseberry mite, while others have a number of food-plants and several generations; *Paratetranychus ununguis* on conifers; *P. pilosus* on Rosaceae and elm; *P. quercinus* on oak; and *Schizotetranychus schizopus* on willow.

The author divides the genus *Tetranychus* into *Tetranychus* and *Epitetranychus*, according to the length and shape of the penis. *T. carpini* occurs on oak, hazel and hornbeam; *T. telarius* on lime, horse-chestnut and maple; *T. salicicola* on willow and poplar; *E. althaeae* on numerous food-plants, including beans, gherkins, grape vine and hops; *E. ludeni* is closely allied to the preceding species and occurs in greenhouses; *E. viennensis* injures apple, pear, bird cherry, etc.; and *E. fagi* occurs on beech. *Neotetranychus rubi* infests wild raspberry.

Remedies must be adapted to the bionomics of the species involved. In the case of such species as live on trees and leave them to hibernate, an attempt may be made to prevent migration. Good results have been obtained by spraying the trunks with lime-sulphur before the spring migration, and an application in autumn before the autumn migration is also advisable. It is possible that adhesive and trap bands may be useful. In the case of hops and vines the poles and supports should be disinfected. Sprays must be applied at 8–10 day intervals, because the eggs and resting-stages are resistant to their action. A solution of alum and lime-sulphur combined with potato starch, or, preferably, gelatine, has given good results. Fumigants are useful in greenhouses.

In Germany natural enemies play a part in checking these mites. They include other mites, such as *Anystis baccarum* and probably *Sejulus vepallidus*, Hemerobiid larvae, Coccinellids—especially *Stethorus punctillum*, a bug, *Triphleps minutus*, and a beetle, *Oligota* sp.

ZACHER (F.). **Der Birnenknospenstecher und andere Schädlinge im Havelobstgau.** [The Pear Blossom Weevil and other Pests in the Havel Fruit District.]—*Verh. Deutsch. Ges. angew. Ent. 3. Mitgliederversammlung zu Eisenach 28. bis 30. September 1921*, pp. 64-66. Berlin, 1922. [Received 26th January 1923.]

The most important pest in these districts is *Psylla mali*, which in 1920 was so abundant that most of the apples failed to ripen. The spray recommended by Theobald (24–30 lb. burnt lime, 10–12 lb. salt, 1 lb. water-glass and 20 gals. water) was tried in February 1921, with splendid results. The pear-blossom weevil, *Anthonomus cinctus*,

Koll., is a pest that is widespread and injurious in Brandenburg, but has received little attention. The adult oviposits in autumn in the bud, and in spring the larva, which resembles that of the apple-blossom weevil [*A. pomorum*], is found in the bud shoots. It reaches maturity in April and May and pupates in the bud. After a pupal period lasting about 14 days the weevil appears in May or June, and at first skeletonises the leaves. Later on the leaf-stems and young shoots are attacked. The adult injury is, however, unimportant. Mating occurs in September, and the males then die, while the females begin to oviposit. Some very small larvae found in May point to the fact that some females hibernate and then oviposit in spring. On bush and espalier-trained fruit trees it is easy to break off infested buds, but such buds often fall very prematurely, and the larva is sometimes found in the shoot beneath the bud. A carbolineum spray in autumn is said to protect large trees against oviposition.

Cherries were severely attacked in 1921 by *Rhynchites aequatus* and *R. pauxillus*. *Anthonomus druparum* and a Lepidopterous larva do similar damage, penetrating into the fruit pulp, in which they remain. A bug, *Dolycoris baccarum*, also attacks cherries, the leaves looking torn and ragged, while the fruits are deformed. Peaches are injured by the larva of the sawfly, *Lyda nemoralis*.

Locusts as a Food.—*Jl. Dept. Agric. Union S. Africa*, vi, no. 1, pp. 5 6. Pretoria, January 1923.

It is recognised that locusts have a distinct value as a food for stock, particularly for poultry. The results of the analysis of two samples of *Locustana pardalina*, Wlk. (*Pachytylus sulcicollis*, Stål) (brown locust) are given. Locusts are too rich in protein to form a suitable food alone. They are highly nitrogenous and if unmixed would probably be too stimulating. They should be mixed with a considerable quantity of food rich in starch or other carbohydrate to make a ration of the proper albuminoid ratio (about 1 : 4). The continued use as food of maize only is a dangerous practice, particularly in the case of poultry, and a mixture of 1 lb. of ground locusts with about 5 lb. maize meal would furnish a well-balanced and almost ideal food for poultry. The analysis also shows that locusts contain over 5 per cent. of ash, including about 1·6 per cent. of phosphoric acid and a considerable quantity of potash, and would therefore make up the deficiency of ash constituents, especially phosphates, which characterises maize; this is important, as it is known that a deficiency in mineral matter is the cause of susceptibility to disease among animals fed on many African-grown foods. For pigs, sheep and cattle also, locusts if mixed with other food are suitable; they are valuable for milk production in dairy cows, and the manure produced by the animals would contain more fertilising constituents. For manurial purposes locusts should be finely ground, and if the fat they contain were removed, their decomposition in the soil would be more rapid.

Departmental Activities: Entomology.—*Jl. Dept. Agric. Union S. Africa*, vi, no. 1, pp. 14–15. Pretoria, January 1923.

In October 1922 there was an outbreak of larvae of *Cirphis leucosticha* and *Barolia torrentium* on sugar-cane. The larvae feed at night on the young shoots and during the day hide in the trash. Fields burned

over before cutting were little affected. Outbreaks of these caterpillars, under similar circumstances, have been recorded for many years past. For several seasons a maize weevil, *Protostrophus* (*Strophosomus*) sp., has been very troublesome, and climatic conditions and plant vigour appear to be important factors controlling the severity of attack. It is thought that when the season is favourable and the maize grows rapidly the attack of the weevil is largely confined to the basal leaves. The lily borer [? *Brithys pancratii*] attacks *Crinum* and other plants belonging to the lily family. The larvae on hatching bore into the plant tissue until the food material is exhausted, when they feed on the outside of the plant. Hand collection and the removal and destruction of infested leaves are the best measures. Egg-clusters should be destroyed. Spraying with 1 oz. powder or 2 oz. paste lead arsenate to 1 gal. water may be resorted to when hand collection is too laborious.

PETCH (T.). **Studies in Entomogenous Fungi: II.—The Genera** *Hypocrella* **and** *Aschersonia*.—*Ann. R. Bot. Gdns., Peradeniya*, vii, pt. 3, pp. 167–278, 4 plates. Peradeniya, October 1921. [Received 30th January 1923.]

The genera *Hypocrella* and *Aschersonia* are discussed from a taxonomic standpoint, with a list of the species. It was originally supposed that the species of these two genera were parasitic on the plants on which they occurred, but it is now known that they are parasitic on the insects infesting the plants. So far as has been determined, they are all parasitic on Coccids and Aleurodids.

PETCH (T.). **Interim Notes on Entomogenous Fungi.**—*Ann. R. Bot. Gdns., Peradeniya*, vii, pt. 4, pp. 323–327. Peradeniya, June 1922. [Received 30th January 1923.]

Torrubiella tenuis, sp. n., is parasitic on *Aspidiotus destructor* and Aleurodids in Ceylon, and *T. sublintea*, sp. n., *T. barda*, sp. n., and *Aschersonia intermedia*, sp. n., on Aleurodids in Chili. *T. rubra*, *T. luteorostrata*, *T. tenuis*, *T. tomentosa* and *T. lecanii* are all known to be parasitic on scale-insects. *Lisea parlatoria* has recently been found on *Chionaspis* sp. in Ceylon.

Mauritius: Annual Report on the Department of Agriculture for the Year 1921.—21 pp. Port Louis, 1922. [Received 30th January 1923.]

The campaign against *Lachnosterna* (*Phytalus*) *smithi* has been carried out on the same lines as in 1920 [*R.A.E.*, A, ix, 145, 511]. There was a further decrease (of about 7½ millions) in the number of beetles captured, and the value of the parasite, *Tiphia parallela*, was evident. *Elis thoracica*, introduced in 1917 from Madagascar, is exercising extensive control on *L. smithi* in one area. *Oryctes tarandus* has been considerably checked on certain estates as a result of the digging-out of larvae and the capture of adults. The parasite *Scolia oryctophaga* was not observed during 1921. The proprietors of some sugar estates have offered financial help to facilitate further importations of this Scoliid, but owing to the existence of bubonic plague in Madagascar and Mauritius, it has not been possible to carry this out.

SWENK (M. H.) & WEHR (E. E.). **Experiments with Poisoned Baits for Grasshoppers.**—*Nebraska Agric. Expt. Sta.*, Bull. 183, 28 pp. Lincoln, Neb., January 1923.

These experiments were carried out almost entirely against *Melanoplus bivittatus* (two-striped grasshopper), which was the dominant species during 1922 in the North Platte valley of Nebraska. As a base for poisoned baits wheat bran is recommended, as it is more attractive than either beet pulp or fresh horse manure. Fresh leaves are more attractive than bran, but impracticable for the purpose.

Although crude arsenic and Paris green are quicker in effect than white arsenic, the latter is recommended owing to its greater attractive powers and lower price. Sodium arsenite made by boiling white arsenic and sal soda is more efficient than dry poison.

The addition of molasses or soap does not increase the attractiveness of the bait. Oranges are 5 per cent. more attractive than lemons, but 30 to 50 per cent. more expensive. Banana oil is more attractive to young grasshoppers than lemons and is cheaper; it should be used on the basis of 3 oz. as the equivalent of six lemons. Though slightly less attractive than lemons to adult grasshoppers, its consistent use is ordinarily recommended.

SWENK (M. H.). **Insect Pests of Stored Grains and their Control.**—*Nebraska Agric. Expt. Sta.*, Circ. 15 (Revised), 14 pp., 8 figs. Lincoln, Neb., December 1922.

This information concerning the insect pests of stored grain and their control has already been noticed [*R.A.E.*, A, x, 298].

D'EMMEREZ DE CHARMOY (D.). **An Attempt to introduce Scoliid Wasps from Madagascar to Mauritius.**—*Bull. Ent. Res.*, xiii, pt. 3, pp. 245-254, 4 plates. London, January 1923.

Oryctes tarandus has for some time been responsible for considerable damage to sugar-cane in Mauritius, and an account is given of an expedition to Madagascar to study the habits of Scoliid wasps prior to their possible introduction for the control of this beetle. The observations of previous authors show that parasitism by Scoliids is not exclusively specific, but rather generic, and that the same host may be parasitised equally well by Scoliids of different species. Similar observations made by the author and others show that in certain cases this tendency can even go beyond the limits of genera.

There was a marked variation in the number of Scoliids, including *Scolia oryctophaga*, Coq., and *Elis romandi*, Sauss., caught at different times in Madagascar, and the adults were remarkably local. Their extraordinary powers of flight, which enable them to seek their preferred food over considerable distances, may account for this. Their partiality for certain flowers is very notable, and this peculiarity is of great significance. In a country like Mauritius, where *Oryctes* is found everywhere, a reduction of the pest at certain points, such as on cultivated lands, is more important than a reduction of the total number. For this purpose it would be necessary to concentrate the greatest number of Scoliids possible at such spots, and this could easily be done by establishing artificial plantations of favourite food-plants at these points, which would confine the wasps thereto as long as required. These observations also apply to other species,

such as *S. iridicolor*, Smith, *Elis pfeifferae*, Sauss., and *E. thoracica*, F., the last-named having a preference for *Stachytarpheta indica*. In Mauritius *Tiphia parallela*, Smith, is attracted in a similar manner by *Cordia interrupta*, and *Elis rufa*, Lep., also feeds on its flowers. It is useless to try and acclimatise Scoliids without supplying the appropriate flowers to serve as food for the adults. It is suggested that in countries such as Queensland or Porto Rico, where white grubs cause a great deal of damage, advantage might be taken of the feeding habits of the adult parasites in order to increase the efficiency of their control by providing suitable food-plants on the lines indicated.

Although conditions of transport were most unfavourable, of 1,033 insects shipped, 805 were landed alive in Mauritius, the technique employed being described.

Preliminary investigations in Madagascar showed that *S. oryctophaga* was capable of successfully parasitising *O. tarandus*, and breeding experiments were continued in captivity after the return from Madagascar. The eggs are laid over a period of more than six weeks. In captivity the greatest number laid was 19. They generally hatch in six days. The cell in which the parasitised larva lies is constructed by the Scoliid before the egg is laid. The larval period of the parasite lasts from 10 to 12 days, but the pupal stage varies greatly, some of 3, 10 and 14 months being recorded. The reason for this is not clear; in the case of a parthenogenetic female the pupal period for all the offspring was uniform, whilst that of the progeny of another, fertilised, female varied from 3 to 11½ months under similar conditions throughout. There can, however, only be one generation a year.

The occurrence of parthenogenesis in *S. oryctophaga* leads to the belief that it will prove to be a not unusual phenomenon in this group of Hymenoptera.

Although it will be some time before *S. oryctophaga* can control to an appreciable extent the damage done by *Oryctes*, yet there is every reason to believe that it has become acclimatised in Mauritius. Now that sufficient data have been acquired, it is proposed to make further importations of this species.

Notes are given on eight other Scoliids occurring in Madagascar, but there is no indication that any of the introduced species besides *S. oryctophaga* has become established in Mauritius.

Elis rufa has not hitherto been found in Madagascar, but it is extremely common in certain localities in Mauritius, though unknown in others. Owing to its activities, the Melolonthids, *Rhizotrogus pallens*, Arr., and *R. gravidus*, Arr., are prevented from becoming serious pests of sugar-cane. The life-history of this species varies very little from that of *S. oryctophaga*, the chief difference being in the duration of the pupal stage, which, in the case of *E. rufa*, has never been found to exceed three months; the egg-stage lasts five days and the larval period 12. The beetles parasitised by this species are found from 4 to 6 in. underground, but are never enclosed in cells.

WATERSTON (J.). **A New Phytophagous Chalcid attacking Bamboo.**—*Bull. Ent. Res.*, xiii, pt. 3, pp. 307-310, 2 figs. London, January 1923.

Harmolita aequidens, sp. n., is described from the Federated Malay States, where the larvae were found tunnelling in bamboo stems.

SPEYER (E. R.). **Mycetophilid Flies as Pests of the Cucumber Plant in Glass-houses.**—*Bull. Ent. Res.*, xiii, pt. 3, pp. 255–259, 1 plate, 8 figs. London, January 1923.

Since January 1922 considerable damage has been caused to cucumber roots under glass in Britain by the larvae of *Pnyxia (Epidapus) scabiei*, Hopk. Particulars of the life-history are quoted from Hopkins, *Proceedings of the Entomological Society of Washington*, vol. iii, p. 152 (1895). From 20 to 30 eggs are laid by each female in soil or manure, and these hatch in five or six days. The larvae feed for seven or eight days and pupate in a silky cocoon, the adults emerging three days later. Broods of flies appear every 20 to 25 days.

In the present infestation the tap-roots of the plants had been hollowed out from below upwards to within ½ in. to ¼ in. below the soil surface. Some root-stems contained as many as 60 larvae. When full fed, the larvae ate their way out of the stem below the ground and pupated in the soil. On no part of the plant were any eggs found. It is practically certain that the larvae were brought into the house with the manure at the time of planting. At the time of the attack the plants had been insufficiently watered, the deficiency of water in the soil no doubt causing the larvae to invade the roots of the plant. Infestations of cucumbers by another fly, *Plastosciara perniciosa*, Edw., have been recently reported. A list is given of the chemicals experimented with for the control of the larvae in the soil, but none of the substances tried seemed of any appreciable value. Immersion of the plants and soil in water for 12 hours, however, gave very satisfactory results both experimentally and on a large scale. This measure is applicable to both *Pnyxia scabiei* and *Plastosciara perniciosa*.

BRYANT (G. E.). **New Injurious Phytophaga from India and Brazil.**—*Bull. Ent. Res.*, xiii, pt. 3, pp. 261–265, 4 figs. London, January 1923.

The following new species are described :—The Eumolpids, *Bromiodes squamosus*, from India, attacking young leaves of pear trees, *Brevicolaspis villosa*, from South Brazil, attacking coconut palms, and *Metachroma rosae*, from Jamaica, attacking leaves of roses ; and the Halticid, *Zomba gossypii*, gen. et sp. n., from Nyasaland and N.W. Rhodesia, on cotton. This last is the first species of the subfamily MONOPLATINAE to be recorded from Africa, the others being almost exclusively from South America.

ROEBUCK (A.). **On the Occurrence of Leaf-eating Sawflies on Cereals in Britain.**—*Bull. Ent. Res.*, xiii, pt. 3, pp. 267–269, 3 figs. London, January 1923.

Pachynematus clitellus, Lep., and *Dolerus haematodis*, Klug, were found to be the sawflies responsible for the damage to oat and wheat crops in Britain in 1918 and each season since. During the latter part of July the larvae disappear from the fields and pupate in the ground. In the laboratory the adults emerged during the first half of May, and this appears to correspond closely with natural conditions. All died within 24 hours of emergence except one female of *D. haematodis*, the oviposition of which is described, the eggs being produced parthenogenetically. The larvae hatched on the third and fourth day. Pupation was not observed during the experiments, as the larvae remained inert during the winter and died in the spring.

WILLIAMS (C. B.). **A Froghopper damaging Cacao in Panama.**—*Bull. Ent. Res.*, xiii, pt. 3, pp. 271–274, 1 plate, 3 figs. London, January 1923.

A Cercopid, *Clastoptera theobromae*, sp. n., destroys at least half the flowers of cacao in Panama. It was found in one instance on a wild forest tree closely related to cacao, indicating that it is a native species. No eggs were obtained, but all the evidence points to their being laid in the tissue of the flower stalk. Froth masses containing four or five nymphs were found on the flower stalks, invariably causing them to wither and die. On two occasions froth masses were deposited on the stalk of a small pod at the base of a young shoot.

The larvae of *Drosophila* sp. and the brown seed-like puparia of this fly were also found in the froth masses, but as they were thought to be inquilines, no further attention was paid to them. Since then *D. paradoxa*, Lamb, has been observed in the froth of *Clastoptera taeniata*, Schmidt, in Trinidad, where it undoubtedly kills the nymphs.

C. theobromae must be considered a potential pest, and must be carefully watched in case conditions should favour its rapid multiplication and spread.

GRANDI (G.). **Identification of some Fig Insects (Hymenoptera) from the British Museum (Natural History).**—*Bull. Ent. Res.*, xiii, pt. 3, pp. 295–299, 2 figs. London, January 1923.

The species dealt with are *Blastophaga quadraticeps*, Mayr, from Ceylon and Singapore; *B. williamsi*, sp. n., from Barbados; *Ceratosolen fuscipes*, Mayr, from India, Ceylon and Java; and *C. crassitarsus*, Mayr, from Singapore, the Malay Peninsula and Java.

ZACHAREWICZ (—). **The "Bombyx dispar"** (*Lymantria dispar*) **injurious to Apricot Trees in Vaucluse.**—*C.R. Acad. Agric. France*, viii, no. 24, p. 679. Paris, 20th June–5th July 1922. (Abstract in *Internat. Rev. Sci. & Pract. Agric.*, xiii, no. 8, pp. 1057–1058. Rome, August 1922.) [Received 30th January 1923.]

In the department of Vaucluse apricot trees are seriously injured by *Porthetria* (*Lymantria*) *dispar*, L., which destroys the leaves from May onwards. The measures recommended are the crushing of the egg-masses, sprays of lead arsenate or lime, and the use of sticky bands. In June the larvae may be trapped in faggots or bundles of brushwood.

SVIRIDENKO (P. A.). **Кузнечики и меры борьбы с ними.** [Grasshoppers and their Control.]—**Нар. Ком. Зем. С.С.Р. Грузии. Бюро борьбы с вредителями С.Х.** [*National Commissariat Agric. Georgia, Bur. Control Agric. Pests.*], 11 pp., 3 figs. Tiflis, 1922.

Long-horned grasshoppers have become unusually abundant in Georgia and cause serious damage, the crops affected including oats, wheat, sunflowers, maize and potatoes. The species concerned are *Tettigonia* (*Locusta*) *caudata*, *Decticus verrucivorus* and *Pholidoptera* (*Olinthoscelis*) *indistincta*. A brief and popular account is given of

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their habits. The recommendations for remedial measures include close sowing, the removal of shelter, ploughing in the autumn and spraying with Paris green. Under conditions of severe infestation only winter crops should be sown.

BEREZHKOV (R. P.). **К вопросу о технике приманочного метода борьбы с саранчевыми в Сибири и загранице.** [The Technique of Poison Baits for Locusts in Siberia and elsewhere.]—**Известия Сибирского Энтомологического Бюро.** [*Bull. Siberian Ent. Bur., Omsk*], no. 1, pp. 16–22. Petrograd, November 1922.

A comparison of recent observations on the preparation and use of poison baits for locusts shows a great similarity between the results obtained independently in America and Siberia. In Siberia this method has entirely replaced all others, and is being successfully applied over an area of about 540,000 acres. As an attractant, peppermint has given some success, but aromatic substances can only be of value if applied in sufficient quantity to mask the odour of the bait, and this is economically impracticable. Bran, sawdust or horse dung are in themselves sufficient for all practical purposes. Under Siberian conditions the last two are of the greatest practical value. Salt applied in small quantities has no effect on maintaining the humidity of the bait, whereas in large quantities it reduces its attractiveness. When the above substances are used as a basis the bait is just as eagerly devoured in the dry state. The sawdust bait was eaten and proved fatal after ten days' exposure to dry weather, but under favourable meteorological conditions bran retains its efficacy for at least a week and horse dung for five days. For practical purposes all the three substances are effective, though experimentally bran is quicker in its effect, whereas sawdust is more resistant to rain. The mortality obtained with these substances after five days amounts to 97–99 and 92–99 per cent. respectively; it was 90–94 per cent., and in certain experiments even 98, in the case of horse dung. Sodium arsenite has been generally used in Siberia, but a few experiments with Paris green proved its superiority. Limited experiments carried out in 1921 with arsenious oxide (As_2O_3) gave results entirely opposite to those obtained in America. This was probably due to the use of sawdust as a base, whereas in America bran was used. To produce the same results about double the quantity of arsenious oxide was required as compared with sodium arsenite. The optimum dose of the latter appears to lie between ¾ and 1 lb. to 30 lb. bran. The use of more than this appears to decrease the efficacy of the bait. In America 7½ lb. of bait to the acre proved effective; this agrees with Siberian experiments with horse dung, but in the case of bran and sawdust about 12 lb. and 10 lb. were used respectively. Experiments with smaller quantities are now in progress.

ANTONOV (N. V.). **Влияние некоторых метереологических факторов на жизнь саранчевых.** [The Influence of some Meteorological Factors on the Life of Locusts.]—**Известия Сибирского Энтомологического Бюро.** [*Bull. Siberian Ent. Bur., Omsk*], no. 1, pp. 22–26. Petrograd, November 1922.

During the spring of 1919 the weather was generally unfavourable to locusts, but all stages were found to be active as soon as the conditions improved.

The results of experiments with varying temperatures and conditions show that locusts may withstand freezing at −5° C. [23° F.] for any length of time and in any stage, and even temperatures down to −10° and −14° C. [14° and 6.8° F.] are not always fatal to all stages. These experiments have been confirmed under natural conditions with individuals of *Gomphocerus sibiricus*. High temperatures are more noxious to the young stages than to the adults, the males being more resistant than the females. Air heated to 60°–90° C. [140°–194° F.] caused death in from 25 seconds to 2 minutes. Rain cannot be considered of any value as an adverse factor.

BESKUKOV (Yu. G.). **Краткое сообщение о деятельности Омской лаборатории Сибирского Энтомологического Бюро за 1919–1922 г. г.** [Brief Report of the Activities of the Omsk Laboratory of the Siberian Entomological Bureau for 1919–1920.]—**Известия Сибирского Энтомологического Бюро.** [*Bull. Siberian Ent. Bur., Omsk*], no. 1, pp. 26–30. Petrograd, November 1922.

The work of the Omsk laboratory has been directed chiefly to the study of locusts and their control. Of the species studied the first to appear is *Gomphocerus sibiricus*, L., the others, in order of their appearance, being *Arcyptera flavicosta*, Fisch., *Stauroderus* (*Stenobothrus*) *morio*, L., other species of *Stenobothrus*, and *Mecostethus grossus*, L. Biological observations were also made on *Arcyptera fusca*, Pall. In the case of *G. sibiricus* the life-cycle from the hatching of the egg to the imago is 30 days under artificial conditions, but in nature only about 25. The eggs hatch more rapidly in sandy soil, but excess of moisture retards hatching. They can hatch at a depth of 10½ in., so that ploughing is not likely to be a successful measure. The following parasites of the egg-masses were observed:—*Mylabris quatuordecimpunctata*, Pall., in *Arcyptera flavicosta*; *Systoechus ctenopterus*, Mik., in *G. sibiricus* and *Stauroderus morio*; *Siphonella palposa*, Fall., in *Stenobothrus nigromaculatus*. *Mylabris quatuordecimpunctata* requires two years for its development. The adults of *G. sibiricus* and *S. morio* were parasitised by a species of *Sarcophaga*. Egg-masses of *Stenobothrus nigromaculatus*, *Psophus stridulus*, *Aeolopus* (*Epacromia*) *tergestinus* and *Dociostaurus* (*Stauronotus*) *brevicollis*, not previously mentioned in the literature, have been received at the laboratory, and keys for their determination are being prepared. A key for the determination of all species by the larvae is also under preparation.

ROHD (E. G.). **Вредные насекомые, зарегистрированные Лабораторией Алтайского Энтомологического Бюро с 1-го июня по 15-го июля 1922 года.** [Injurious Insects registered by the Laboratory of the Altai Entomological Bureau from the 1st June to 15th July 1922.]—**Известия Сибирского Энтомологического Бюро.** [*Bull. Siberian Ent. Bur., Omsk*], no. 1, pp. 30–32. Petrograd, November 1922.

Of this list of 71 insects the following were the most injurious: Lepidoptera:—*Aporia crataegi*, L., *Liparis* (*Lymantria*) *monacha*, L., and *Agrotis* sp. Coleoptera:—*Anthonomus rubi*, Hbst., *Melolontha hippocastani*, F., *Phyllotreta* spp., *Cassida nebulosa*, L., *Agriotes lineatus*, L., *Lema melanopa*, L., *Amphimallus solstitialis*, L., *Epicauta dubia*, F.,

E. erythrocephala, Pall., *E. megalocephala*, Gebl., *Mylabris quatuordecimpunctata*, Pall., and *M. crocata*, Pall. Orthoptera :—*Gomphocerus sibiricus*, L., *Arcyptera fusca*, Pall., *A. flavicosta*, Fisch., *Stauroderus* (*Stenobothrus*) *morio*, L., and *Calliptamus italicus*, L. Hymenoptera :—*Athalia colibri*, Christ (*spinarum*, F.).

LEBEDEV (F. N.). **Опыты по применению удушающих средств в деле истребления азиатской саранчи.** [Experiments with the Application of Asphyxiating Materials for the Destruction of the Asiatic Locust.]—**Труды третьего Всероссийского Энтомо-Фитопатологического Съезда в Петрограде, 18–25 Декабря 1921.** [*Proc. 3rd All-Russian Entomo-Phytopath. Meeting in Petrograd, 18th–25th December 1921*], pp. 1–8. Petrograd, 1922.

The use of bran, straw, dung or sawdust for poison baits against locusts is not recommended, as only about 25 to 40 per cent. are killed when any of the first three are used, and the locusts are unable to masticate sawdust. Although this is opposed to the views of Siberian investigators, the author considers that the results obtained with sawdust are due to stray poison from the scattered bait adhering to grass, etc. As measures with poison baits are not applicable in some types of country, such as marshy districts, etc., experiments with poison gas have been undertaken. It is evident from these that where the conditions are favourable to them the insects will revive from the effects of the gas and complete their development, though they are an easy prey to natural enemies in the interval.

In dense reeds and marshes the gas has proved very effective, lethal doses penetrating as far as 150 feet. For a plot of 210 feet by 560 feet, 135 cylinders (7,290 lb. chlorine) are required. These should be arranged in three rows along the longer side of the plot.

SALDAU (P. Ia.). **Опыты применения удушливых газов для уничтожения саранчевых.** [Experiments with Asphyxiating Gases for the Control of Locusts.]—**Труды третьего Всероссийского Энтомо-Фитопатологического Съезда в Петрограде, 18–25 Декабря 1921.** [*Proc. 3rd All-Russian Entomo-Phytopath. Meeting in Petrograd, 18th–25th December 1921*], pp. 9–25. Petrograd, 1922.

These experiments were carried out during the summer of 1921 in the Kuban district. The use of poison gas for the destruction of locusts is limited to swamp areas of dense reeds, etc., where the use of poison baits or spraying is impossible, and it cannot be employed in general agricultural practice. The usual method of releasing the gas from batteries of six cylinders has proved the least effective one. The best results were obtained by the release of the gas from a row of single cylinders, followed almost immediately by a second row, so that the gas cloud is unbroken. In the actual experiment 136 cylinders were arranged in two parallel rows along a front of 73 feet. The cylinders in the first row were released simultaneously, and as soon as the stream of gas began to diminish (three minutes), the second row was let off, the operation lasting in all seven minutes, using about two tons of chlorine to 1½ furlongs. With this method of application lethal doses will penetrate to about 300 feet into the depth of the

reeds in the direction of the wind. A large number of the locusts rendered insensible by the gas fall into the water and remain unharmed unless the concentration of gas is above 1 per cent. The water alone has no effect on the locusts, as they are able to swim across a river over four miles wide.

MEIER (N. F.). **Биологический метод борьбы с вредными насекомыми.** [The Biological Method of Controlling Injurious Insects.]—**Труды третьего Всероссийского Энтомо-Фитопатологического Съезда в Петрограде, 18–25 Декабря 1921.** [*Proc. 3rd All-Russian Entomo-Phytopath. Meeting in Petrograd, 18th–25th December 1921*], pp. 26–33. Petrograd, 1922.

Previous literature in connection with the biological control of insect pests in various parts of the world is reviewed, and the opinion is expressed that this method, though excellent so far as it goes, can only be considered as supplementary to other remedial measures.

KOBLOVA (F. V.). **О новом паразите** *Agriotes lineatus*, **L.** [A new Parasite of *A. lineatus*, L.]—**Труды третьего Всероссийского Энтомо-Фитопатологического Съезда в Петрограде, 18–25 Декабря 1921.** [*Proc. 3rd All-Russian Entomo-Phytopath. Meeting in Petrograd, 18th–25th December 1921*], pp. 34–35. Petrograd 1922.

An undetermined Proctotrupid is recorded as parasitising *Agriotes lineatus*, L., in Orlov.

RIMSKI-KORSAKOV (M. N.). **К биологии верблюдок (Rhaphidiidae).** [Biology of Rhaphidiidae.]—**Труды третьего Всероссийского Энтомо-Фитопатологического Съезда в Петрограде, 18–25 Декабря 1921.** [*Proc. 3rd All-Russian Entomo-Phytopath. Meeting in Petrograd, 18th–25th December 1921*], pp. 36–43, 2 plates. Petrograd, 1922.

In observations made in Finland and the Government of Voronezh, the larvae of these Neuroptera were proved to live in the bark of trees or stumps and not, as is generally stated, under the bark. In Pavlovsk (Voronezh), *Rhaphidia ophiopsis*, L., and *Inocella crassicornis*, Schummel, were found in the bark of stumps in a forest of mixed pines, and were obviously feeding on *Myelophilus piniperda*, L., which occurred in great abundance.

The morphology and development of the various stages as described by previous authors are reviewed and additional notes are given.

BOLDYREV (V. F.). **Несколько замечаний о шелковистом точильщике** *Niptus hololeucus*, **Fald. (Coleoptera, Plinidae).** [Some Remarks on *N. hololeucus*.]—**Труды третьего Всероссийского Энтомо-Фитопатологического Съезда в Петрограде, 18–25 Декабря 1921.** [*Proc. 3rd All-Russian Entomo-Phytopath. Meeting in Petrograd, 18th–25th December 1921*], pp. 44–56. Petrograd, 1922.

This paper, which has a brief summary in English, deals with the general distribution of *Niptus hololeucus*, Fald., according to various authors, and describes in detail the construction of the cocoon.

REICHARDT (A. N.). **Материалы к изучению вредных насекомых Воронежской губернии.** [Insect Pests of Voronezh.]—**Труды третьего Всероссийского Энтомо-Фитопатологического Съезда в Петрограде, 18-25 Декабря 1921.** [*Proc. 3rd All-Russian Entomo-Phytopath. Meeting in Petrograd, 18th–25th December 1921*], pp. 57-76. Petrograd, 1922.

In this list the pests collected in Voronezh during the summer of 1916-1917 are arranged under the orders, with brief notes on their occurrence and habits.

MORDVILKO (A. K.). **Кровяная яблоневая тля** (*Eriosoma lanigerum*, **Hausmann**).—**Труды третьего Всероссийского Энтомо-Фитопатологического Съезда в Петрограде, 18–25 Декабря 1921.** [*Proc. 3rd All-Russian Entomo-Phytopath. Meeting in Petrograd, 18th–25th December 1921*], pp. 77–82. Petrograd, 1922.

This paper forms the author's abstract of a monograph by him to be published later.

The history and occurrence of *Eriosoma lanigerum*, Hausm., according to previous authors, is reviewed. This Aphid is unable to withstand either very low temperatures or summer drought. It is generally considered to be a native of North America, in which opinion the author concurs. In spite of a very careful search in the spring of 1917, it was not found on elm in Transcaucasia or the vicinity of Tashkent, though a new species of *Eriosoma* was discovered on *Ulmus campestris*, on which it produces almost the same abnormalities as *E. lanigerum* does on elm in North America. Attempts, however, to transfer this species to young apple shoots in the laboratory failed.

The absence of *E. lanigerum* from elm in Russia in spring and early summer may be due to the fact that it is not attracted to the existing species of elms, or, as is more probable, that it migrates to *Ulmus campestris*, on which it produces a generation of both sexes, and that the females lay eggs in cracks in the bark, but the resulting nymphs die out, being unable to establish themselves on the shoots or under the young leaves. It must be therefore supposed that *U. campestris* is not a suitable alternative food-plant for *E. lanigerum*, and that in the absence of *U. americana* the Aphids disappear after August or September. All these observations show that *U. americana*, or certain trees, such as *Pyrus*, *Sorbus*, *Crataegus*, etc., are essential to the normal development of the life-cycle of *E. lanigerum* as occurring in North America.

A review of almost all the ERIOSOMINAE living on elm shows the following to occur on *U. americana* in North America: *Tetraneura graminis*, Mon., *T. ulmifusus*, Patch, *Eriosoma americanum*, Riley, and *E. lanigerum*, Hausm. (*rileyi*, Thomas). In the Palaearctic region on *U. campestris* and *U. montana* occur *Tetraneura ulmi*, DeG., *T. rubra*, Licht., *T. pallida*, Haliday, *Eriosoma ulmi*, L., *E. lanuginosum*, Hart. and *E. phoenax*, sp. n.; apparently only *Colopha compressa*, Koch, occurs in the Palaearctic region on *U. pedunculata* or *U. effusa* and in North America on *U. racemosa*. An interesting point is that different species cause similar abnormalities on different elms in the different regions, thus *E. americanum* in North America corresponds to *E. ulmi* of the Palaearctic region, and *E. lanigerum* of North America

to the new species of Transcaucasia and Turkestan. *E. americanum* migrates to *Amelanchier canadensis* and *E. ulmi* to roots of currants and apparently to pears. *E. lanigerum* migrates to apple, *Sorbus* and *Crataegus*. It is not yet known to what plant *E. phoenax* migrates. The European species of ERIOSOMINAE occurring in North America are only found on wych elm (*U. montana*), with which they were probably introduced. The author considers that the occurrence of *E. lanigerum* on elm in Great Britain [*R.A.E.*, A, ix, 230] must be explained either by the elm concerned proving to be *U. americana* or possibly that the species was *E. phoenax*, though he has not seen Theobald's original. Careful examination of material from America proves *E. rileyi*, Thomas, to be identical with *E. lanigerum*, Hausm.

MORITZ (L. D.). **Отчет о деятельности Ставропольской Станции Защиты Растений от Вредителей с 1916 по 1921 год включительно.** [Report on the Activities of the Stavropol Station for the Protection of Plants from Pests from 1916 to 1921 inclusive.]—**Труды третьего Всероссийского Энтомо-Фитопатологического Съезда в Петроградѣ, 18–25 Декабря 1921.** [*Proc. 3rd All-Russian Entomo-Phytopath. Meeting in Petrograd, 18th–25th December 1921*], pp. 83–103. Petrograd, 1922.

Pests recorded during the period under review include *Saturnia pyri*, Schiff., *Biston hirtarius*, Cl., *Notolophus* (*Orgyia*) *antiquus*, L., and *Eriogaster* (*Lasiocampa*) *lanestris*, L.

MORITZ (L. D.). **Отчет о борьбе с перелетной саранчей** (*Pachytylus migratorius*, **L.**) **в Ставропольской губернии за 1917–1921 годы.** [Report on the Control of *Locusta migratoria*, L., in the Stavropol Government during 1917–1921.]—**Труды третьего Всероссийского Энтомо-Фитопатологического Съезда в Петрограде, 18–25 Декабря 1921.** [*Proc. 3rd All-Russian Entomo-Phytopath. Meeting in Petrograd, 18th–25th December 1921*], pp. 104–114. Petrograd, 1922.

An account is given of the local outbreaks of *Locusta* (*Pachytylus*) *migratoria*, L., during the years under review. The measures employed consisted chiefly of poisoning the food-plants by spraying with sodium arsenite (3–4 lb.), with the same amount of zinc oxide to about 63 gals. of water.

MORITZ (L. D.). **Обзор вредителей Ставропольской губернии.** [Review of Pests of Stavropol.]—**Труды третьего Всероссийского Энтомо-Фитопатологического Съезда в Петрограде, 18–25 Декабря 1921.** [*Proc. 3rd All-Russian Entomo-Phytopath. Meeting in Petrograd, 18th–25th December 1921*], pp. 115–130. Petrograd, 1922.

This long list of insect pests occurring in Stavropol is arranged under the orders, brief notes being given on the date of occurrence and the plants infested.

Golovanova (T. M.). **Отчет о деятельности Отделения Орловской Станции Защиты Растений от Вредителей при Брянском Губземотделе за 1921 год.** [Report of the Activities of the Department of the Orlov Station for the Protection of Plants from Pests at the Briansk Provincial Department of Agriculture for 1921.]—**Труды третьего Всероссийского Энтомо-Фитопатологического Съезда в Петрограде, 18–25 Декабря 1921 года.** [*Proc. 3rd All-Russian Entomo-Phytopath. Meeting in Petrograd, 18th–25th December 1921*], pp. 131–136. Petrograd, 1922.

This station was opened on 1st January 1921, and an account is given of the first year of its work. A list is also given of the insect pests recorded during the year, with brief notes of their occurrence and food-plants.

Nemirov (A.). **Роль насекомых в опадании завязей и образовании падалицы у яблонь.** [Insects as a Cause of the Falling of Fruit Buds of Apples.]—**Труды третьего Всероссийского Энтомо-Фитопатологического Съезда в Петрограде, 18–25 Декабря 1921.** [*Proc. 3rd All-Russian Entomo-Phytopath. Meeting in Petrograd, 18th–25th December 1921*], pp. 137–142. Petrograd, 1922.

The various causes of the falling of fruit buds of apples are discussed, the part played by insects in this connection having received special attention. The insects concerned are the weevils, *Anthonomus pomorum* and *Rhynchites bacchus*, and the sawfly, *Hoplocampa testudinea*. Details are given of the relative infestation of several varieties of apples, both foreign and local.

Anutchin (A. V.). **Люцерновая моль** (*Anacampsis biguttella*, **H.-S.**).—**Труды третьего Всероссийского Энтомо-Фитопатологического Съезда в Петрограде, 18–25 Декабра 1921.** [*Proc. 3rd All-Russian Entomo-Phytopath. Meeting in Petrograd, 18th–25th December 1921*], pp. 143–145. Petrograd, 1922.

The moth recorded as attacking lucerne [*R.A.E.*, A, iii, 91] in Turkestan has been identified as the Gelechiid, *Anacampsis biguttella*, H.-S., though it is possible that it may be a new species.

Parfentev (M. A.). **Насекомые, повреждающие лекарственные растения в Крыму.** [Insects injurious to medicinal Plants in the Crimea.]—**Труды третьего Всероссийского Энтомо-Фитопатологического Съезда в Петрограде, 18–25 Декабря 1921 года.** [*Proc. 3rd All-Russian Entomo-Phytopath. Meeting in Petrograd, 18th–25th December 1921*], pp. 146–148. Petrograd, 1922.

This information has already been noticed from another source [*R.A.E.*, A, ix, 303].

ARKHANGELSKAIA (A.). **К вопросу о фауне червецов (Coccidae) России и, в частности, Туркестана.** [On the Coccidae of Russia and especially of Turkestan.]—**Труды третьего Всероссийского Энтомо-Фитопатологического Съезда в Петрограде, 18–25 Декабря 1921.** [*Proc. 3rd All-Russian Entomo-Phytopath. Meeting in Petrograd, 18th–25th December 1921*], pp. 149–151. Petrograd, 1922.

From the available literature it would appear that only 33 species of Coccids have been recorded from Russia. The author intends to make a detailed study of this subject. During 1920 and 1921, 40 species belonging to five subfamilies were found.

WÜLKER (G.). **Zur Kenntnis der Nematodengattungen** *Allantonema* **und** *Bradynema*. [A Contribution to a Knowledge of the Nematode Genera *Allantonema* and *Bradynema*.]—*Senckenbergiana*, iii, no. 1–2, pp. 1–9. Frankfort a. M., 15th March 1921.

The Nematode, *Allantonema mirabile*, Leuckart, is a parasite of the pine weevil, *Hylobius abietis*, L. *Bradynema strasseni*, sp. n., was found in *Rhagium* larvae from pine wood, and *B. rigidum*, v. Sieb., and *Rhabditis aphodiorum*, sp. n., in *Aphodius fimetarius*, L.

HORST (A.). **Zur Kenntnis der Biologie und Morphologie einiger Elateriden und ihrer Larven. (Insbesondere Untersuchungen über** *Agriotes obscurus*, **L.**). [A Contribution to a Knowledge of the Biology and Morphology of some Elaterids and their Larvae (particularly investigations on *A. obscurus*, L.).]—*Arch. Naturgesch.*, lxxxviii, no. 1, pp. 1–90, 3 plates, 102 figs. Berlin, February 1922.

This comprehensive article is divided into three parts, biological, morphological and anatomical. The first deals with the damage caused by Elaterid larvae in general, with experiments in breeding such larvae and with the life-histories of *Agriotes obscurus*, L., *Corymbites aeneus*, L., *Lacon murinus*, L., and *Elater sanguineus*, L. In the second part the larval and pupal stages of all these species are described in detail. The third part deals chiefly with the genital organs of Elaterids, and the article concludes with observations on the possibilities of control, the author being of the opinion that these beetles may be most successfully combated in the pupal stage.

NELSON (R.). **Transference of the Bean Mosaic Virus by** *Macrosiphum solanifolii*.—*Science*, lvi, no. 1447, pp. 342–344. Garrison, N.Y., 22nd September 1922.

Conditions strongly suggesting that mosaic disease in beans is spread by insects were observed in Michigan in 1921. The disease suddenly appearing in the water cultures of beans growing in the greenhouse and infested with Aphids indicated the method of dissemination. Experiments carried out, both in the greenhouse and in the field, gave definite proof of the transfer of the virus by *Macrosiphum solanifolii*.

ELMER (O. H.). **Mosaic Cross-inoculation and Insect Transmission Studies.**—*Science*, lvi, no. 1448, pp. 370–372. Garrison, N.Y., 29th September 1922.

Experiments in cross-inoculation show that the mosaic diseases of the Cucurbitaceae, Solanaceae and Leguminosae are inter-transmissible, infection being to a large degree determined by the growth condition of the plant. The optimum condition for infection is an unchecked, vigorous growth of the plant. Mosaic disease is proved to be transmissible both by Aphids and mealy-bugs, *Pseudococcus* (*Dactylopius*).

KING (H. H.). **Note on the Origin of the Migratory Locust.**—*Sudan Notes & Records*, v, no. 1, pp. 54–56. Khartoum, April–July 1922.

The migratory locust, *Schistocerca peregrina*, Ol., is one of the most important pests of agriculture in the Sudan. In order to combat it successfully it is essential to know the conditions that cause the periodical appearance of this insect, but the scanty information collected on the subject of the movement of locusts in the Sudan does not permit of any definite conclusion as to their source. The author's theory is that locusts arriving from the direction of the Libyan desert breed in the Sudan, some of their descendants returning to the west; the remainder scatter and live more or less solitary lives in the bush, and subsequently collect again in swarms to breed.

STEINER (G.) & HEINLY (H.). **The possibility of Control of *Heterodera radicicola* and other plant-injurious Nemas by means of predatory Nemas, especially by *Mononchus papillatus*, Bastian.**—*Jl. Washington Acad. Sci.*, xii, no. 16, pp. 367–386, 10 figs. Easton, Pa., 4th October 1922.

Methods of culture of the predatory Nematode, *Mononchus papillatus*, are described, with particulars of its life-history and feeding habits. It was found that the number of Nematodes killed daily by an individual of *M. papillatus* increased as it developed. In one case as many as 83 *Heterodera radicicola* were killed by one individual in a day, and during a lifetime of about 12 weeks one example destroyed 1,332 of these Nematodes. It attacks and kills all kinds of Nematodes, Rotifers, etc., and it is possible that under some conditions it completely controls *Heterodera* and other species injurious to plants. It is only when moving freely in the soil during larval life that *Heterodera* and its allies are destroyed by *Mononchus*. Once in the roots they are protected from attack. To put this to practical use a knowledge of the Nematode population of different kinds of soil is necessary, and it is in this direction that a large field for investigation is opened up, the results of which will be of immense importance to agricultural science.

PRUDHOMME (A.). **Le Phylloxéra et la Vigne.**—*Riviera Scientifique*, vii, no. 4, pp. 259–264. Nice, 1920. [Received 1st November 1922.]

Vines slightly attacked by *Phylloxera* and treated in time with carbon bisulphide are found to be more resistant to a fresh attack. A slight attack checked appears therefore to have the effect of a prophylactic.

HERBERG (M.). **Das Tracheensystem der Schildläuse.** [The Tracheal System of Coccids.]—*Deutsche Ent. Zeitschr.*, no. 1, pp. 152–157, 1 fig. Berlin, 15th February 1922. [Received 9th November 1922.]

The title of this article indicates its contents.

VIELWERTH (V.). **Červivost makovic.** [Infestation of Poppies.]—*Ochrana Rostlin*, ii, no. 4, pp. 50–51. Prague, November 1922.

In Czecho-Slovakia great injury is caused to poppies by various pests, the chief of which are the beetles, *Ceuthorrhynchus macula-alba*, Hbst., and *Stenocarus* (*Coeliodes*) *fuliginosus*, Marsh. The larvae of the latter feed on the roots, and the adults destroy the leaves.

The only remedial measure is to cut down and burn all infested plants. Fresh seed should not be sown in the vicinity of fields infested the previous year.

EVANS (W.). **Notes on the Wood-wasps (*Sirex*) occurring in Scotland; with special reference to their present-day Distribution.**—*Scot. Nat.*, no. 131-132, pp. 175–189, 1 table. Edinburgh, November–December 1922.

There are two species of *Sirex* in Scotland, *S. gigas*, L., and *S. cyaneus*, F. The natural enemies capable of exercising any real control on their numbers are the Ichneumonid, *Rhyssa persuasoria*, L., which is a parasite of the larvae, and the great spotted woodpecker.

THEOBALD (F. V.). **A New Genus and two New Species of Aphides from Ross-shire.**—*Scot. Nat.*, no. 133–134, pp. 19–20, 1 fig. Edinburgh, January–February 1923.

Jacksonia papillata, gen. et sp. n., and *Acaudus bipapillata*, sp. n., both on potato, are described.

PRIESNER (H.). **Beiträge zur Lebensgeschichte der Thysanopteren. I. *Thrips klapaleki*, Uz., ein Orchideenschädling.** [Contribution to the Life-history of the *Thysanoptera*. I. *T. klapaleki*, Uz., an Orchid Pest.]—*Sitz. Akad. Wiss. Wien.* Abt. I, cxxx, no. 6–7, pp. 215–222, 6 figs. Vienna, 1921. [Received 2nd January 1923.]

Larvae of the little-known *Thrips klapaleki*, Uz., are recorded from the flowers of *Orchis* spp. in Austria, in company with *Thrips tabaci*, Lind., *T. physapus*, L., var. *obscuricornis*, Pr., *T. major*, Uz., *Frankliniella intonsa*, Tryb., and *Haplothrips aculeatus*, F.

GHESQUIÈRE (J.). **Notice monographique sur les *Helopeltis*, Sign. (Miridae) éthiopiens.**—*Rev. Zool. Afr.*, x, no. 3, pp. 281–300. Brussels, 15th December 1922.

A key to the African species of *Helopeltis*, with particulars of the geographical distribution, habitat and food-plants of the genus are given. The new species are *Helopeltis maynéi* and *H. lemosi*, and several new varieties are also described.

Cotton, cacao, guava, mango and *Aralia* spp. are seriously damaged by *Helopeltis*; avocado and cassava appear to resist attack better. *Helopeltis bergrothi*, of which a brief life-history is given, is preyed upon by an Asilid, and Mantid nymphs have been observed to feed on the larvae of these Capsids.

GHESQUIÈRE (J.). **Un Réduvide prédateur du** *Sahlbergella singularis*, **Hgl.**—*Rev. Zool. Afr.*, x, no. 3, p. 329. Brussels, 15th December 1922.

The Reduviid, *Carcinomma astrologus*, Bergr., is predacious on *Sahlbergella singularis*, Hgl., in cacao plantations in the Belgian Congo and greatly resembles it in coloration and general appearance.

KULKARNI (G. S.). **The "Murda" Disease of Chillie** (*Capsicum*).—*Jl. & Proc. Asiatic Soc. Bengal*, xvii (1921), no. 4, p. lxxxix. Calcutta, August 1922. [Received 9th January 1923.]

The contents of this paper on a Tarsonemid mite infesting *Capsicum* have been noticed from another source [*R.A.E.*, A, x, 236].

HUSAIN (M. A.) & NATH (D.). **Spraying in the Punjab.**—*Jl. & Proc. Asiatic Soc. Bengal*, xvii (1921), no. 4, p. xci. Calcutta, August 1922. [Received 9th January 1923.]

In spite of assertions that the time for resorting to measures such as spraying in India has not yet come, very successful spraying operations have been carried out in the Punjab against citrus psylla [*Trioza*] and mango leaf-hoppers [*Idiocerus*] on a large scale.

PRUTHI (H. S.). **Morphology and Biology of the Red Cotton Bug,** *Dysdercus cingulatus* (**Fabr.**).—*Jl. & Proc. Asiatic Soc. Bengal*, xvii (1921), no. 4, pp. cxlviii–cxlix. Calcutta, August 1922. [Received 9th January 1923.]

The habits, life-history and external and internal anatomy of the cotton-stainer, *Dysdercus cingulatus*, F., are described in detail.

PRIESNER (H.). **Zur Thysanopteren-Fauna Ostpreussens.** [The Thysanopterous Fauna of East Prussia.]—*Schrift. Physik. Oekonom. Ges. Königsberg in Pr.*, lvii (1916), pp. 50–54. Leipzig, 1917. [Received 13th January 1923.]

The food-plants and distribution in Europe of 24 species of Thysanoptera are given.

KROGERUS (R.). **Studien über** *Agrilus*-**Arten. I. Zur Biologie des** *Agrilus mendax*, **Mannerh.** [Studies on *Agrilus* Species. I. On the Biology of *A. mendax*.]—*Notulae Entomologicae*, ii, no. 1, pp. 10–14, 3 figs. Helsingfors, 5th May 1922.

The distribution and life-history of *Agrilus mendax* are given, with a description of the larva and pupa. This Buprestid attacks the mountain ash, preferring trees that are weakly or that have been previously damaged.

KROGERUS (R.). **Studien über** *Agrilus*-**Arten. II. Zur Biologie des** *Agrilus ater* **L.** (= *sexguttatus*, **auct.**). **III. Beiträge zur Kenntnis der** *Agrilus viridis*-**Formenreihe.** [Studies on *Agrilus* Species. II. On the Biology of *A. ater*. III. Contributions to a Knowledge of forms of *A. viridis*.]—*Notulae Entomologicae*, ii, no. 4, pp. 109–113, 6 figs. Helsingfors, 15th December 1922.

The food-plants of *Agrilus ater*, L., are poplar, aspen and oak. It has formerly been found only in Asia Minor, South Europe, France, Germany and South and Central Russia, but was recorded in Finland

in the summer of 1922. Details are given of its life-history. *Agrilus viridis*, L., subsp. *paludicola* n., found on *Betula nana* in Finland, is described, and particulars of its life-history are given.

McKay (M. B.). **Distribution of *Tylenchus dipsaci* on Wild Strawberry in Oregon. Preliminary Report.**—*Phytopathology*, xii, no. 9, pp. 445–446. Lancaster, Pa., September 1922.

The leaf and stem-infesting Nematode, *Tylenchus dipsaci*, Kühn, has been found on cultivated strawberries and on clover in Oregon, and during 1921 on wild strawberry in the same district.

Kozikowski (A.). **Niezwykle zerowanie kornika brózdkowa-nego (*Pityophthorus micrographus*, L.).** [The unusual Feeding of *P. micrographus*, L.]—*Polskie Pismo Ent.*, i, pt. 2, pp. 42–43, 1 fig. Lwow, 1922.

The bark-beetle, *Pityophthorus micrographus*, L., which usually attacks spruce, is recorded as infesting the branch of a cherry tree in a spruce wood.

Kéler (S.). **Kilka wyjasnien w sprawie drwalnika znaczonego (*Xyloterus signatus*, F.).** [Some Explanation concerning the Bark-beetle, *X. signatus*, F.]—*Kosmos*, 1921, pp. 100–104, 3 figs. Lwow. [Received 29th January 1923.]

Owing to the difficulty in determining *Xyloterus signatus*, F., a corrected and amplified description is given in English and Polish both of this species and of *X. lineatus*, Oliv.

Jablonowski (J.). **A szemes gabonában található tokos molyról (*Coleophora tritici*, Lind.—helyesen *C. ciconiella*, H.-Sch.).** [Pistol Case-bearer, *C. ciconiella*, H.-Sch. = *C. tritici*, Ld., in the Seed.]—*Kisérletügyi Közlemények*, xxiv, no. 3, pp. 191–202, 2 figs. Budapest, September–December 1921. With a Summary in English. [Received 1st February 1923.]

Though *Coleophora ciconiella*, H.-S. (*tritici*, Ld.) has been found in wheat, rye and oat seed after threshing, it does not as a rule injure these cereals in Hungary. The author believes that the larvae live in the capsules of the seeds of weeds (*Silene* or *Agrostemma*), and that when full-grown they may enter the stalks and ears of cereals. They generally pass the winter among chaff and trash, but occasionally may be found among the stored seed, from which they may be easily sifted out. Clean seed should be used for sowing and the weeds in question continually destroyed.

Vereshtchagin (B. V.). **Dare de Seama asupra activitătei Statiunei Bio-entomologice pe timp de zece ani (1911-1921).** [Report on the Activities of the Bio-Entomological Station for the Ten Years of its existence, 1911–1921.]—*Minist. Agric. Bessarabia Sta. Bio-Ent.*, 44 pp. Kishinev, 1922.

Much of this information has already been noticed [*R.A.E.*, A, xi, 43], the additional pests recorded being *Eriophyes vitis*, Land., on vines and generally distributed throughout Bessarabia; *Aspidiotus ostreaeformis*, Curt., on pears; *Rhynchites aequatus*, L., on apples, pears and plums; *Byctiscus betulae*, L. (*Rhynchites betuleti*, F.) on

vines and pears; *Malacosoma (Lasiocampa) neustria*, L.; *Coleophora* sp. on plums; *Pieris rapae*, L.; *Plutella maculipennis*, Curt. (*cruciferarum*, Zell.); *Haltica oleracea*, L.; *Phyllotreta (H.) nemorum*, L.; *Brevicoryne (Aphis) brassicae*, L.; *Baris chloris*, F.; and *Pyrausta nubilalis*, Hb. (*Botys silacealis*, Hb.). *Galleria mellonella*, L., is a constant menace to apiculture.

In experiments with insecticides it was found that the addition of Bordeaux mixture to white arsenic prevented scorching of the leaves.

During 1922 *Psylla pyrisuga*, F., was very injurious to pears; *Euxoa (Agrotis) segetum*, Schiff., and *Phytometra (Plusia) gamma*, L., were abundant on sugar beet, and *Homoeosoma nebulella*, L., on sunflowers.

A list is appended of all the agricultural pests recorded from 1911 to 1922, giving the food-plant and part attacked.

LEEFMANS (S.). **Een ernstige, nog onbekende plaag van de Java-jute, de spiraalboorder (*Agrilus acutus*, Thunb.).** [A serious new Pest of Java Jute, the Spiral Borer, *A. acutus*.]—*Meded. Inst. Plantenziekten*, no. 56, 6 pp., 3 plates. Buitenzorg, 1922. [Received 1st February 1923.]

In 1922 stems of jute, *Hibiscus cannabinus*, in Sumatra, were found to be injured by a Buprestid borer, *Agrilus acutus*, Thunb. This beetle seems to be indigenous in both Java and Sumatra. Descriptions of the adult larva and pupa are given. The injury takes the form of an embossed spiral round the stem, such as would result from the constriction due to a parasitic creeper. If the bark is lifted, the mine of the young larva can be seen in the cambium. This shallow mine becomes deeper as the larva grows. The constriction results in checking the flow of sap, and the stems wither, blacken and break off. A number of plants allied to *H. cannabinus*, including members of the same genus, were examined, but were not found to be attacked, except that uncertain traces occurred in a stalk of *H. venustus*. The native food-plants of *A. acutus* are not yet known. The plantations should be watched, and immediately the characteristic injury is noticed affected plants should be destroyed.

JOCHEMS (S. C. J.). **De invloed van zwavelkoolstof op de kiemkracht van tabakszaad.** [The Effect of Carbon Bisulphide on the Germinative Power of Tobacco Seed.]—*Bull. Deli Proefst.*, no. 17, 12 pp. Medan, 1922. With a Summary in English. [Received 1st February 1923.]

Disinfection of tobacco-seed infested with *Lasioderma serricorne* by means of carbon bisulphide (0·15 – 0·20 cc. per 1,000 cc. space for two days) affects the germination to a considerable extent. The results depend largely on humidity (in the air of the chamber and in the seed) and on the time elapsing between fumigation and the germination test. Five different kinds of seed fumigated in a relative humidity of 55 and 82 were all dead when tested three months later, the sample with the highest degree of humidity being quite dead immediately after the exposure. With a relative humidity of 85, a concentration of 0·012 cc. CS_2 practically did not affect germination, but this is harmless to *L. serricorne*. With a relative humidity approximating zero, even the highest concentration of carbon bisulphide fails to affect germination.

GAHAN (A. B.). U.S. Bur. Ent. **Report on a small Collection of Parasitic Hymenoptera from Java and Sumatra.**—*Treubia*, iii, no. 1, pp. 47-52. Buitenzorg, 1922. [Received 1st February 1923.]

The species include :—EULOPHIDAE : *Mestocharella javensis*, sp. n., and *Asympiesiella india*, Gir., from larvae of *Gracilaria theivora*, Wlsm. ; *Diaulomella javensis*, sp. n., from mixed larvae of *Gracilaria* and *Cydia* (*Laspeyresia*) ; *Pleurotropis lividiscutum*, sp. n., from *Apanteles hidaridis*, Rohwer ; *Euplectrus* sp. from young larvae of *Ophideres fullonica*, L. ; and *Tetrastichus australasiae*, sp. n., from *Periplaneta australasiae*, F. ELASMIDAE : *Elasmus brevicornis*, sp. n., from *Erionota thrax*, L. ENCYRTIDAE : *Schedius podontiae*, sp. n., from *Podontia affinis*, Grond. ; and *Leurocerus ovivorus*, Crwfd., from eggs of *Amathusia phidippus*, L. SCELIONIDAE : *Telenomus latisulcus*, Crwfd., from eggs of *Poecilocoris hardwicki*, Westw.

ROHWER (S. A.). U.S. Bur. Ent. **Descriptions of Javanese Braconidae (Hym.) received from Mr. S. Leefmans.**—*Treubia*, iii, no. 1, pp. 53-55. Buitenzorg, 1922. [Received 1st February 1923.]

The species dealt with are *Apanteles papilionis*, Vier., from larvae of *Papilio sarpedon*, L. ; *A. homonae*, sp. n., from *Homona coffearia*, Nietn. ; *A. hidaridis*, sp. n., from larvae of *Hidari* [*irava*, Moore] ; *A. parasae*, sp. n., from larvae of *Parasa* ; and *Microbracon leefmansi*, sp. n., from *Gracilaria theivora*, Wlsm. The males only of an apparently new species of *Macrocentrus* were also taken from the larvae of *H. coffearia*.

LEEFMANS (S.). **Some Additional Notes on the preceding " Report on a small Collection of Parasitic Hymenoptera from Java and Sumatra by A. B. Gahan " and on " Descriptions of Javanese Braconidae received from Mr. S. Leefmans by S. A. Rohwer."**—*Treubia*, iii, no. 1, pp. 56-58. Buitenzorg, 1922. [Received 1st February 1923.]

These notes contain references to the author's previous papers [*R.A.E.*, A, x, 281 ; xi, 23], with some additional information. The pupae of *Asympiesiella india*, Gir., are not enveloped in a cocoon, but are merely attached to the tea leaf by the apex of the abdomen. Four females and one male of *Mestocharella javensis*, Gah., were obtained from a single caterpillar of *Gracilaria theivora*, Wlsm. *Pleurotropis lividiscutum*, Gah., is parasitic on *Apanteles hidaridis*, Rohw., and therefore a hyper-parasite of the Hesperid butterfly, *Hidari irava*, Moore. As many as 18 cocoons of *Apanteles homonae*, Rohw., were obtained from one individual of *Homona coffearia*, Nietn.

[With reference to an earlier note (*R.A.E.*, A, x, 282), we have since received undoubted specimens of *H. coffearia* taken by Mr. Leefmans in Java.—Ed.]

EGGERS (H.). **Neue Borkenkäfer (Ipidae) aus Afrika.** [New Bark-beetles from Africa.]—*Ent. Blätter*, xviii, no. 4, pp. 163-174. Berlin, 30th December 1922.

This is a supplement to a previous paper [*R.A.E.*, A, viii, 487], and contains several corrections, with descriptions of the following new Scolytids : *Dactylipalpus imitans* from Kamerun ; *Metahylastes*

africanus, gen. et sp. n., from Kenya Colony and the Belgian Congo; *Phloeosinus schumensis* and *Ozophagus orientalis* from Tanganyika Territory, the former being taken on *Juniperus procera*; *Stephanoderes camerunus* from Kamerun; *S. bananensis* from the Belgian Congo; *S.* (?) *similis* and *Neocryphalus usagaricus*, gen. et sp. n., from Tanganyika Territory; *Ctonoxylon montanum* from Kamerun; and *C. methneri*, *Xyleborus aegir*, *X. holtzi*, *X. forficulus*, *X. usagaricus* and *Hyloscyllus africanus* from Tanganyika Territory, *X. usagaricus* being also from the Congo.

STÄGER (R.). **Beitrag zur Lebensgeschichte der Fliedermotte** (*Xanthospilapteryx syringella*, **F.**). [A Contribution to the Life-history of *Gracilaria syringella*.]—*Mitt. Entomologia Zürich*, i, no. 6, pp. 368–400. Zürich, 1923.

The appearance of the adults of *Gracilaria* (*Xanthospilapteryx*) *syringella*, F., in spring is related to the development of lilac, occurring when the tree is in full bloom and with fully formed but tender foliage. Oviposition occurs on the leaves, not on the leaf-buds. Batches of 6–20 eggs are laid on the undersides of the leaves, and the larvae bore the leaf epidermis until they reach the epidermis of the upper leaf-surface. After about a fortnight they abandon the mined leaf, proceed to a fresh one near by and begin to roll it, several individuals combining to bring this about. Some 10–12 days are passed in the roll, and the larvae then let themselves down by threads to the ground, where they pupate. Pupation lasts about three weeks, the total life-cycle from egg to adult occupying about seven weeks. The pupae of the autumn generation hibernate in cocoons in the ground, in bark cracks or in the leaf-rolls.

The food-plants observed were *Syringa vulgaris*, *S. persica*, *Ligustrum vulgare*, *Fraxinus excelsior* and *F. ornatus*.

FROGGATT (W. W.). **Insect Pests of the Cultivated Cotton Plant. No. 1. The Noctuid Moths belonging to the Genus** *Earias*.—*Agric. Gaz. N.S.W.*, xxxiii, no. 12, pp. 863–866. Sydney, December 1922.

In Australia there are 38 indigenous species of *Hibiscus* and eight of *Gossypium*. It is most probable that the insect fauna of these plants, which are all closely related to cotton, will turn their attention to this crop when planted in any field where these species grow under natural conditions. The potential cotton pests already occurring are *Earias insulana*, Boisd. (*smaragdina*, Butl.) (Egyptian cotton bollworm); *E. fabia*, Stoll (Indian bollworm); *E. huegeli*, Rogenh. (Australian green-striped bollworm); *E. parallela*, Lucas; *E. subviridis*, Lucas; *E. ochrophylla*, Turner; and *E. luteolaria*, Hmps. A short description of each is given.

FROGGATT (W. W.). **Texan Mealy Bug and Prickly Pear.**—*Agric. Gaz. N.S.W.*, xxxiii, no. 12, p. 906. Sydney, December 1922.

An attempt has been made to test the value of *Dactylopius tomentosus* (Texan mealy-bug) as a natural enemy of prickly pear (*Opuntia inermis*). The insect was introduced on the plant under a cheese-cloth screen, and when thoroughly spread over all the foliage the screen was removed and the infested leaves cut off and attached to healthy plants. The experiment is still in progress, but the action of the insect under the cover was not very deadly.

LEA (A. M.). **The Lucerne Flea** (*Smynthurus viridis*, **L.**).—*Jl. Dept. Agric. S. Australia*, xxvi, no. 5, pp. 423–426, 4 figs. Adelaide, 15th December 1922.

Smynthurus viridis, L. (lucerne flea) is very troublesome in lucerne fields in South Australia, particularly in July, August and September, when the fields often have a speckled or greyish appearance owing to the number of leaves that have been killed. With the hot weather, these Collembola disappear, and are seldom seen between October and April. The leaves are gnawed irregularly, mostly on the lower surface, until they have a skeletonised appearance, the lower leaves always being attacked first. A favourite food-plant is the African dandelion, others being peas, beans, potatoes, oats, barley and other grasses. Arsenical sprays are recommended, but should be used at their minimum effective strength, otherwise the poison, entering the inner parts of the leaves through the wounds made in feeding, would kill or scorch them. Sprays of hellebore, or soap and tobacco, should also be useful, and oil emulsions could be used with effect, but these should be applied at night, when the insects are feeding actively [*cf. R.A.E.*, A, ix, 492].

NICHOLLS (H. M.). **Report of the Government Microbiologist.**—*Tasmania Dept. Agric. & Stock Rept.* 1921–22, pp. 20–25. Hobart, 1922.

The outbreak of Mediterranean fruit-fly [*Ceratitis capitata*, Wied.], mentioned in the previous report [*R.A.E.*, A, x, 101], practically disappeared during the cooler summer of the year under review. Increasing damage to small fruit is being done in various localities by the currant borer moth [*Aegeria tipuliformis*], particularly in one district, where the black currant crop is a very important one. Although improved spraying resulted in much better control of the codling moth [*Cydia pomonella*, L.], the loss is still estimated at about 20 per cent. of the fruit grown.

The pear-leaf mite [*Eriophyes pyri*] caused damage to young pear trees. A good lime-sulphur spray should be applied just as the leaves are changing colour and beginning to fall, and again in the spring, just before the leaf-buds open.

Imported dates were found to be heavily infested with *Silvanus surinamensis* (saw-toothed grain beetle). It has not as yet established itself permanently as a pest in barns and stables, but it occasionally does great damage to stored chaff and grain. Although it does not seem to survive the cold winters of Tasmania, all imported products containing it should be refused admission.

KURDJUMOV (N. V.) & ZNAMENSKI (A. V.). **Земляные блохи, вредящия хлѣбнымъ злакамъ: I. Полосатая хлѣбная блоха** (*Phyllotreta vittula*, **Redt.**). **II. Стеблевыя хлѣбныя блохи** (*Chaetocnema aridula*, **Gyll.**, **and** *C. hortensis*, **Geoffr.**). [Flea-Beetles injurious to Cereals.]—**Труды Полтавской С.Х. Опытной Станции.** [*Proc. Poltava Agric. Expt. Sta.*], no. 29, 56 pp., 25 figs. Poltava, 1917. [Received 5th February 1923.]

These extensive life-history records have been compiled from the authors' own observations as well as those of previous workers, and include descriptions of the various stages. So far no very satisfactory remedial measure has been found against these pests of grain crops.

A new Braconid, near *Perilitus* and *Euphorus*, was found parasitising the adults of *Phyllotreta vittula*, Redt., *Chaetocnema aridula*, Gyll., *C. hortensis*, Geoffr., and *Aphthona euphorbiae*, Schr. Hibernation occurs in the larval stage inside the host; the adults of this generation appear about the beginning of May. About 90 per cent. of the flea-beetles were parasitised at this time. The parasitic larvae of the next generation emerge from the body of the host at the beginning of June and pupate in a cocoon on the surface of the soil or in cracks in it. Pupation lasts 2–3 weeks, the larval stage about 2 weeks, and the egg-stage 8–10 days, making a total life-cycle of a little over one month. Only one generation develops in the adults of hosts emerging from hibernation, but in young flea-beetles of the new brood two generations may develop, though a definite line of distinction cannot be drawn between them. The adult parasites disappear during August. The method of pursuing the host and actual oviposition is the same as that of *Dinocampus terminatus*, Nees [*R.A.E.*, A, i, 457]. Though the parasite produces sterility in the host attacked, it is not of very great importance, as the majority of the eggs have been laid by the hibernating adults before the parasite begins to take effect in the spring. The summer generations might have been expected greatly to reduce the numbers of the host, but during these observations the parasite never occurred in sufficient abundance at that time. An abridged key to the genera of HALTICINI and also to the species of *Chaetocnema* and *Phyllotreta* compiled by D. A. Ogloblin is included. Although *Chaetocnema tibialis*, Ill., was found on barley, it is considered to be only an accidental occurrence.

KURDIUMOV (N. V.). **Синяя льняная блоха** (*Aphthona euphorbiae*, **Schrank**).—**Труды Полтавской С. Х. Опытной Станций.** [*Proc. Poltava Agric. Expt. Sta.*], no. 30, 26 pp., 9 figs. Poltava, 1917. [Received 5th February 1923.]

The pests of flax in South Russia include *Aphthona flaviceps*, All., *A. euphorbiae*, Schr., and *Longitarsus parvulus*, Payk. Of these *A. euphorbiae*, which is of great economic importance, is here dealt with in detail. The adults hibernate in turf rather than under fallen leaves. In the spring they migrate to flax fields, which may be some distance away, necessitating the crossing of other fields, in which case they may feed to some extent on grain crops. During this period they may also be found on *Sisymbrium*, *Euphorbia* and even the leaves of beet. In the early spring they are found in fairly large numbers among the winter-sown grain crops, their numbers decreasing simultaneously with a relative increase on flax, on which they appear in large numbers by the end of April and beginning of May. This coincides with the appearance of the seedlings above ground. The attack of *A. euphorbiae* on flax at this time is greatly influenced by the prevailing temperature; should the latter favour quick and healthy growth, the flax will be able to withstand and outgrow the injury, otherwise the plants may become stunted and the crop greatly diminished. Fields of widely spaced rows are generally more likely to be attacked. As a rule only the parts of the plant above ground are injured, though on some occasions the cotyledons that have not yet appeared above the surface are attacked, and this is a most serious form of injury. It occurs in the early spring, and again when the adults enter the soil for oviposition. Oviposition under experimental

conditions occurs at the end of April and beginning of May. The eggs are laid in the spaces formed by the cracking of the surface layer of the soil, sometimes on the lateral roots, occasionally on the main roots, or even at a distance of 1–2 cm. from them. The duration of the egg stage varied according to the temperature from 11 to 22 days. According to I. M. Krasilshtshik at least 258 eggs are laid by one female under natural conditions. The larvae feed chiefly on the young rootlets and pupate in the soil about the beginning of June. The adults emerge during July, and may be found on beet in the vicinity of flax fields, though without apparently causing any appreciable damage, whereas the leaves of *Cirsium arvense* are completely skeletonised. At the time of the flax harvest the flea-beetles disappear from the fields and evidently migrate. The duration of the egg, larval and pupal periods respectively are 20, 31 and 19 days, though they vary according to surrounding conditions. Descriptions are given of all the stages.

Late sowing and spraying are not considered to be satisfactory remedial measures. The most successful method of destroying the adults appears to be the use of the hopperdozer, though it has many drawbacks.

The natural enemies are dealt with by A. Znamenski, and include an egg-parasite, *Anaphes* sp., and the Braconid parasite of the adults recorded in the preceding paper. *Anaphes* sp. has also been reared from various species of *Sitona*.

FOLEY (H.) & DE PEYERIMHOFF (P.). **Note sur un Coléoptère Dermestide (*Anthrenus fasciatus*, Herbst) nuisible dans les régions sahariennes.**—*Bull. Soc. Hist. Nat. Afr. Nord*, xiii, no. 9, pp. 285-288, 1 fig. Algiers, 15th December 1922.

The Dermestid, *Anthrenus fasciatus*, Hbst., causes much damage in the Sahara to stored clothing and to various substances, such as furs, brushes, horn instruments, etc., that are left undisturbed for a long time. This beetle, which closely resembles *A. pimpinella*, F., is widely distributed in the warmer parts of the Mediterranean basin.

SURCOUF (J. M. R.). **Recherches sur la Biologie du *Phoenix dactylifera*. Etude sur la culture, les maladies et les parasites du Palmier Dattier en Algérie.**—*Bull. Soc. Hist. Nat. Afr. Nord*, xiii, no. 9, pp. 293-312. Algiers, 15th December 1922.

In the section of this paper dealing with the diseases of the date palm (*Phoenix dactylifera*), the relation of the beetles, *Phyllognathus silenus* and *Oryctes bispinosus*, to the "Doud" disease is discussed [*R.A.E.*, A, x, 288]. The numbers of these larvae are kept in check by a wasp of the genus *Scolia*. Further study is required to determine whether the disease is due to Coleopterous larvae, or to a cryptogamic infection introduced among the débris of insects and their food.

GADD (C. H.) & JEPSON (F. P.). **The Effect of Manures on the Shot-hole Borer of Tea (*Xyleborus fornicatus*, Eich.).**—*Ceylon Dept. Agric.*, Bull. 56, 30 pp. Peradeniya, November 1922.

The experiments described were undertaken to ascertain what manurial substances, if any, have a controlling effect on *Xyleborus fornicatus*, Eich. (shot-hole borer), and to determine, if possible, how this takes place. The results obtained are not conclusive, but the

indications are that the best results may be secured with simple nitrogenous manures, particularly ammonium sulphate and sodium nitrate. Lime, too, may be beneficial. Organic and phosphatic manures gave no better results than occurred in unmanured plots. Potash, in the form of potassium chloride, gave a better result than that obtained from the best control plots, but the improvement was not maintained when it was combined with nitrogen as potassium nitrate.

JEPSON (F. P.). **The Treatment of Buried Prunings on Shot-hole Borer infested Estates.**—*Ceylon Dept. Agric.*, Bull. 54, 38 pp., 11 plates. Peradeniya, October 1922.

Experiments were conducted on one tea estate over a period of 64 days, during which over 10,500 galleries in buried prunings were examined in detail. The percentage of galleries occupied by *Xyleborus fornicatus*, Eich. (shot-hole borer) during the 64 days fell from 91·7 to 18·5 per cent.; the number of adults per 100 galleries decreased from 123·6 to 58·3, pupae from 24·9 to 4·1, larvae from 218 to 30·5, and eggs from 121·5 to 10·6.

The following is an extract from the author's summary. The finding of eggs and larvae in every examination up to the sixty-fourth day after burial is evidence that development proceeds below ground in the buried prunings, and the condition of many of the galleries indicated that the prunings were being entered beneath the ground by beetles that had themselves emerged from the buried prunings. The gradual decrease in the percentage of galleries occupied indicated, however, that this is not the normal procedure. As the mortality is also small, it is concluded that the majority of beetles make their way to the surface of the soil, and so are capable of reinfesting tea in the vicinity. Although the experiments were primarily conducted to ascertain the insecticidal action of certain artificial manures, a number of other substances were also tested.

No benefit by treatment with any artificial manure was indicated. The popular belief that basic slag, when buried with prunings, destroys a large number of gallery inmates, was not, therefore, confirmed. The results obtained with iron and copper sulphates were also negative. Of the simple insecticides tried, phenol alone showed any result, but the benefit derived by treatment was not marked. The best results obtained in the experiments were in the case of two commercial insecticides, both liquid preparations. Unfortunately, however, the cost of treatment is so high that their use, at the rates recommended by the makers, is out of the question in connection with the treatment of prunings. In order to reduce the cost of treatment to an economic basis, these substances would require dilution to a degree at which efficiency would probably disappear, apart from the fact that there are difficulties in treating any considerable area with liquids.

No progress has therefore been made towards finding a satisfactory method of treating prunings at the time of burial so as to destroy the various stages of shot-hole borer contained in the galleries and thus allow prunings to be safely buried wholesale. The only satisfactory method seems to be the use of soil fumigants, though those already on the market are too costly to allow of their use on a field scale in Ceylon. It is considered that the method already advocated by the Department of Agriculture cannot at present be improved upon, and that all the leaves and small twigs should be lopped after pruning for burial and all heavier wood containing the galleries burnt.

No artificial treatment of prunings to enable them to be buried wholesale, as removed from the bush, can compete with this method from an economic point of view. An extended use of green manure trees should compensate for any loss caused by the burning of the heavier wood of prunings, and it is urged that this method should be given a more extended trial.

DUSTAN (A. G.). **A Fungous Parasite of the Imported Apple Sucker (*Psyllia mali*, Schmid.). Artificial Spread of *Entomophthora sphaerosperma*.**—*Agric. Gaz. Canada*, x, no. 1, pp. 16–19. Ottawa, January–February 1923.

Psylla (Psyllia) mali, Schmidb. (imported apple-sucker) reduces the apple crop in Nova Scotia very considerably each year, and during the summers of 1921 and 1922 a very successful attempt has been made to control the pest by means of artificial dissemination of the fungus, *Entomophthora sphaerosperma*, which is well known as an enemy of the apple-sucker in Europe and appeared in Canada in 1920. The disease develops at first in the body fluid of the Psyllid, and later appears externally. The spores are then shot off in immense numbers, and float about in the air until they find another host. At certain periods resting spores are found in the bodies of the adult insects, and it is by means of these that the disease is carried over the winter. The methods used in artificial dissemination were to collect leaves bearing diseased adults from infested orchards and pin them to leaves in orchards where the fungus was not present, and to capture adults in orchards showing the disease and liberate them in others. The second method was only adopted after dissection had shown that 15 per cent. of the adults already carried the disease in the body fluid. The experiment was very successful, and it was found that when the epidemic reached a certain point, the adults that were still able to fly left the infected orchard for a neighbouring one, thus spreading the fungus. It is hoped next year to spread the fungus over a much larger area, and eventually to make use of it throughout the Province.

MCLAINE (L. S.). **The Distribution of the European Corn Borer in Ontario during the Summer of 1922.**—*Agric. Gaz. Canada*, x, no. 1, pp. 31–33. Ottawa, January–February 1923.

The spread of the European corn borer [*Pyrausta nubilalis*, Hb.] in Southern Ontario during 1922 was less marked than in 1921, when the weather was particularly favourable to it. The localities infested up to October 1922 are enumerated, and a table shows its spread since its discovery in Ontario in 1920. Quarantine No. 2 [*R.A.E.*, A, ix, 147], as revised in February 1922 to prevent the movement of maize on the cob, maize stalks, etc., from heavily infested to lightly infested districts, has been thoroughly carried out. Quarantine No. 41, passed by the United States Department of Agriculture [*R.A.E.*, A, x, 595], is explained.

VOGT (E.). **Methoden der Schädlingsbekämpfung. I.** [Methods for Combating Diseases and Pests of Plants. I.]—*Centralbl. Bakt., Protozool., Paras. & Infekt.*, IIte. Abt., lviii, no. 1–3, pp. 66–77. Jena, 15th January 1923.

The various methods are described from a general point of view, prophylactic and remedial spraying and dusting being dealt with. For work on a small scale spraying is considered preferable.

PAILLOT (A.). **Experiments in Controlling the Macrolepidopteron, *Operophthera (Cheimatobia) brumata* in France.**—*C.R. Acad. d'Agric. France*, viii, no. 27, pp. 745–748. Paris, 1922. (Abstract in *Internat. Rev. Sci. Pract. Agric.*, xiii, no. 9, p. 1163. Rome, September 1922.) [Received 5th February 1923.]

Examination of individuals of *Cheimatobia brumata* taken from protective banding on fruit trees seems to indicate that the males normally outnumber the females. It was found that the moths emerge earliest when the average temperature is lowest. This must be taken into account when choosing the most favourable moment for applying banding.

ZANON (V.). **Invasione di *Leptodemus minutus*, Jak., a Bengasi nel maggio 1919.** [An Invasion of *L. minutus* in Bengasi in May 1919.]—*L'Agric. colon.*, xvi, no. 12, pp. 445–450; xvii, no. 1, pp. 22–30, 9 figs. Florence, December 1922 & January 1923.

An account is given of a vast swarm of *Leptodemus minutus*, Jak., which filled the air and covered the ground and walls. These Lygaeids settled on the grass around the oasis, very few being seen in the gardens. *Polygonum equisetiforme* seemed the most attractive plant, though most of the migrants soon died of cold. A description of the adult *L. minutus* is given. Its distribution now includes Cyrenaica in addition to Algeria, the Caucasus and Turkestan. The mass migration of this bug may assist in elucidating the problem of the movements of locusts, and the author inclines to the view that the suggestion as to the stimulus of negative thermotropism in Uvarov's theory of the periodicity and migration of locusts [*R.A.E.*, A, ix, 562] is supported by the fact that this invasion occurred during a hot wind without any apparent necessity for seeking food.

KLEINE (R.). **Untersuchung über die Schäden der *Grapholitha dorsana*, L.** [An Investigation into Injuries due to *Cydia dorsana*.]—*Zeitschr. wiss. Insektenbiol.*, xvii, no. 9–12, pp.153–161. Berlin, 15th November 1922. [Received 6th February 1923.]

The biological conditions governing the infestation of peas by *Cydia (Grapholitha) dorsana*, L., vary considerably in different localities according to the climate and situation. Experiments have shown that in a mixed sowing of peas and cereals the infestation is less than with an unmixed pea crop. In general, dry years favour infestation, while damp and cold years hinder it. Peas are an early crop, and as in the coastal areas of Germany *C. dorsana* only appears comparatively late, the danger period is when the fully grown peas begin to mature and dry in the pods. They have then a water-content of 40–50 per cent. When this later decreases to about 15 per cent. the danger is past. It is thus a question of rapid ripening with a rapid decrease of the water-content, and for this it is necessary that the weather should be dry. Even one shower during the critical period causes the pea seeds to swell and the danger to increase. The usual reason for sowing a mixed crop of Leguminosae, barley and oats, is to insure against the total loss of crop that would result if only one crop were sown and the weather proved unfavourable to it. In the present case, however, the reason for a mixed crop is to avoid giving too favourable an opportunity for the development of the pest. It is necessary to choose such cereals as are taller than the peas, are stout

enough to resist being dragged down by them, and do not ripen before them. The details of a number of experiments are given, the conclusions being that the Leguminosae should not exceed one-third of the sowing, and that the percentage of barley should be kept as low as possible, otherwise the oats will suffer. Barley does not cover the ground well and does not fulfil the desiderata just mentioned. Except in the case of early-ripening varieties of peas, only late-ripening oats should be used. Sowing should take place as early as possible. In a mixed sowing with unsuitable varieties of cereals the peas will suffer more than if they had been sown unmixed, because the attack of *C. dorsana* will be more concentrated.

MANSFIELD (K.). **Der Kartoffelkäfer in Europa.** [The Potato Beetle in Europe.]—*Nachrichtenbl. deutsch. Pflanzenschutzdienst*, iii, no. 1, p. 5. Berlin, 1st January 1923.

In connection with the occurrence of the Colorado potato beetle [*Leptinotarsa decemlineata*] in France, previous appearances in Europe of this pest are briefly noticed.

EXT (—). **Erdbeerschädling.** [A Strawberry Pest.]—*Nachrichtenbl. deutsch. Pflanzenschutzdienst*, iii, no. 1, p. 6. Berlin, 1st January 1923.

In the first half of June 1922 *Ophonus* (*Pseudophonus*) *pubescens*, Müll., caused considerable injury in strawberry fields at Aschersleben, about 60 per cent. of the crop being destroyed. The beetles fed by night on the kernels of the seeds, the pulp being rendered useless. This pest probably occurs in Germany more often than is generally recognised, being doubtless mistaken for *Zabrus tenebroides*, Goeze (*gibbus*, F.). As the beetle avoids light and dislikes leaving the ground, the strawberries may be raised above it. In small plots collection should be resorted to. Traps in the form of pots baited with meat and sunk in the ground are also useful.

WILKE (S.). **Der nebelige Schildkäfer** (*Cassida nebulosa*, **L.**). —*Nachrichtenbl. deutsch. Pflanzenschutzdienst*, iii, no. 2, pp. 9–10. Berlin, 1st February 1923.

In 1922 complaints were received from various parts of Germany of *Cassida nebulosa*, L., injuring beet. Kleine and others have shown that *Chenopodium album* is the true food-plant of this beetle, and the injury recently done to beet is ascribed by Kleine to the weather favouring both *Chenopodium* and the beetle, while weeding was delayed. The adults emerge from their winter quarters in the second half of April. They mate from mid-May to June. The eggs are deposited on both surfaces of the leaves, and the larvae hatch in about a week. The larvae feed on the leaves, which are entirely destroyed after the second moult, only the midrib resisting attack. Towards the end of June beets begin to be attacked, as no more *Chenopodium* is available. By the end of June the injury decreases and pupation begins. The adults appear in about a week. They feed a little and then hibernate. Although there is only one annual generation in Germany, all stages may be found on one plant at the same time. Chalcids parasitise the eggs, and other Hymenoptera infest the larvae. Control is closely bound up with the eradication of weeds, and its success depends largely upon the date when weeding

is carried out. Both beet and *Chenopodium* germinate late and grow at the same time. The most effective time for combating the pest is when eggs and young larvae occur on *Chenopodium*. If weeding is delayed, it is imperative that the weeds should be collected and removed to a distance from the beet fields. If the beet becomes infested, the leaves may be sprayed with Urania green or with a 2–4 per cent. solution of barium chloride, the latter being rendered more adhesive by adding 1 per cent. milk of lime.

Blackman (M. W.). **Mississippi Bark Beetles.**—*Mississippi Agric. Expt. Sta.*, Tech. Bull. 11, 130 pp., 18 plates, 1 map. Agric. Coll., Mississippi, July 1922. [Received 6th February 1923.]

This paper is the third of a series of articles on the Scolytids of Mississippi [*cf. R.A.E.*, A, x, 361–362]. A list is given of the various localities where collections were made, arranged on the basis of soil areas, the trees attacked and the beetles obtained from them. The habits of bark-beetles, their types of burrows and methods of reproduction are recorded.

The economic importance of bark-beetles is shown by the classification of the results of their activities under various headings. The chief damage to forest reproduction is done to recently transplanted young trees. *Dendroctonus valens*, Lec., in the north, and *D. terebrans*, Oliv., in the south, attack healthy pines near the base of the trunk, and kill large areas of the bark near the ground level. *Scolytus (Eccoptogaster) quadrispinosus*, Say (hickory bark-beetle) kills many trees by breeding in the bark of the trunk and limbs, and considerably damages others when the adults burrow into the twigs for food. *Phthorophloeus frontalis*, Zimm., and others bore into the bark of living mulberry or other trees and affect their growth materially. When ambrosia beetles feed on living trees, the trees survive, but the value of the timber is much reduced. The main damage is done by those beetles that kill forest trees. Of these the greater number prefer to breed in felled or weakened trees, only attacking healthy trees if their numbers become excessive. Sporadic outbreaks usually die out after several seasons, but widespread epidemic attacks can be prevented by taking proper precautions and controlling the pests before they become dangerous. Some bark-beetles prefer to breed in recently cut trees, and if they are the true bark-breeding forms they do little damage. Injuries to timber are practically confined to that from which the bark has not been removed. *Micracis langstoni*, Blackm., is capable of doing considerable damage to posts, poles and unbarked timbers.

Factors that influence injury by bark-beetles are lumbering operations, forest fires, mechanical injuries to trees, and unusual climatic conditions, while many natural environmental conditions and parasitic and predacious enemies help to check them. Any remedial measures must take into account these natural checks and be based on them. Methods of keeping forests in the best silvicultural condition, instructions on lumbering operations to prevent undue increase of pests, the use of trap trees, measures against serious outbreaks of primary tree enemies, and the prevention of injuries to timber in the process of logging and after it has been sawn and piled for seasoning are described.

The bulk of this paper deals with the classification and discussion of species. Keys are given to the subfamilies, genera and species.

The new species are *Phloeosinus taxodii*, from branches of the deciduous cypress (*Taxodium distichum*), *Hypothenemus juglandis*, from dead shoots of black walnut, and *H. robustus*, from the bark of a dying limb of sweet gum (*Liquidambar styraciflua*). *Pityophthorus rhois*, Sw., var. *swainei*, n., is described from dead and dying sumach. *Dryocoetes liquidambarus*, Hopk., is treated as a synonym of *D. betulae*, Hopk.

HASEMAN (L.), SULLIVAN (K. C.) & MCBRIDE (O. C.). **[Entomological Investigations, 1921-22.]**—*Missouri Agric. Expt. Sta.*, Bull. 197, pp. 61-66, 3 tables. Columbia, Missouri, December 1922.

A spray solution of 1 lb. dry lead arsenate to 50 U.S. gals. water and a dust of 15 parts dry lead arsenate to 85 parts hydrated lime were used against the corn ear-worm [*Heliothis obsoleta*], but the operation showed no marked result in either case. The calyx spray for the codling moth [*Cydia pomonella*] was the only measure against this pest on which work was done. Owing to the almost complete crop failure in the previous year larvae were very scarce, and the spring adults produced few first brood larvae. Collections made in April 1922 showed that 60 per cent. of overwintering larvae had pupated. The San José scale [*Aspidiotus perniciosus*] is still the most troublesome pest of nursery stock. It is almost impossible to eradicate it from infested peach trees by means of a spray. In nearly every case the use of paradichlorobenzene against the peach borer [*Aegeria exitiosa*] showed a mortality of 100 per cent. The soil round the crown of the tree should be levelled down, and $\frac{3}{4}$ oz. paradichlorobenzene placed in a ring 2 in. from the tree, and covered with a considerable amount of soil, and this should be scraped away after 21 days. Treatment should preferably be carried out in the autumn, and only to trees over six years old.

In investigations into the control of the chinch bug [*Blissus leucopterus*] beneficial results have been obtained from attempts to demonstrate widely the value of winter burning of the rubbish, etc., in which it shelters, and the use of the ditch-log-dust barrier to prevent the immature bugs from migrating to maize has proved successful.

BOWDITCH (F. C.). **Notes on the Gipsy Moth in my unsprayed Woods at East Marion, Mass., 1922.**—*Psyche*, xxix, no. 5-6, pp. 213-216. Boston, Mass., October-December 1922.

The gipsy moth [*Porthetria dispar*] has been increasing for the past two seasons, and it was thought that in 1922 a maximum infestation would be reached. The trees concerned were oaks and white pines. About the middle of June the larvae were plentiful, but were not attacked by larvae of *Calosoma* sp. until the end of the month. These beetles showed a preference for larvae that were ready to pupate. Early in July most of the larvae had pupated, and the adults began to emerge about the 10th July. By this time the bulk of the larvae and pupae had been killed, but there were still thousands of pupae. When the moths emerged they were devoured by various birds, which remained until the main emergence had taken place. The females began to lay eggs almost at once, but on all egg clusters examined the imported Japanese egg-parasite [*Schedius kuvanae*], the adult of which emerges in the autumn, has been observed.

BOURNE (B. A.). **Report of the Assistant Director of Agriculture on the Entomological and Mycological Work carried out during the Season under Review.**—*Rept. Dept. Agric., Barbados, 1921–22*, pp. 9–16. Barbados, 1922.

On sugar-cane, *Sipha flava*, Forbes (yellow aphis) has been found far from the locality where it was first discovered during the previous year, but the direct damage was not serious. *Diatraea saccharalis*, F., caused considerable loss in dry districts, and the egg parasite, *Trichogramma minutum*, Riley, does not appear to check this borer under existing conditions. Only cuttings free from the pest should be selected. Egg-batches should be bred out in the field in tins surrounded with water, so as to drown any unparasitised larvae and yet to liberate any useful parasites. Both *Diaprepes abbreviatus*, L., and *Lachnosterna smithi*, Arr., did severe damage in several instances. *Stenocranus saccharivorus*, Westw. (cane fly) was not observed.

Cotton remains free from the attacks of new pests. Attacks by *Eriophyes gossypii*, Banks, were only reported as severe where a second picking had been attempted. This mite would be kept well under control if infested plants were destroyed at once.

Duomitus punctifer, Hmps., is the most troublesome tea pest. The larvae of this Cossid have been observed to kill large branches or the entire tree in the case of whitewood (*Tecoma leucoxylon*), avocado pear (*Persea gratissima*), sapodilla (*Achras sapota*), inga (*Pithecolobium saman*) and soap-berry (*Sapindus saponaria*). A list is given of the principal plants and trees infested with minor pests during the year.

Work connected with Insect and Fungus Pests and their Control.—*Rept. Agric. Dept., St. Vincent, 1921*, pp. 15–25. Trinidad, 1922.

During 1921 a survey of the island was made in connection with *Dysdercus delauneyi* (cotton-stainer). In six areas the stainers were found breeding in numbers, this being due to the presence of fruiting silk-cotton trees, *Eriodendron anfractuosum*, and of *Ochroma lagopus*, near cotton fields. In the north, *Sterculia caribaea* grows profusely, and there were some living adults on the trees, but numerous dead insects were found, and all were covered with the fungus, *Sporotrichum globuliferum*. Stainers were also found breeding on this tree near Georgetown. In this case cotton plants in certain fields had not been properly destroyed, and their secondary growth formed an abundant food supply for the stainers.

Experiments to determine what effect the feeding of stainers on various parts of the plants on which they were found would have on their life-history show that they can be raised from eggs to maturity on the seeds and flowers of *Sida*, on the fruit of *Momordica*, on cotton seed meal and on their own dead. They cannot, however, exist for any length of time on many plants on which they are frequently seen. The fact that in one trial only males were reared when fed on *Sida* might have been of importance, and further tests were therefore made. Of 60 nymphs experimented with, 5 reached maturity, 3 of which were females. Adults fed on cotton seed and subsequently on *Sida*, etc., are able to provide a generation of nymphs, one-third of which attains maturity. Both in the field and experimentally, adults seem to be more general feeders than the nymphs. The well-being of stainers, especially the nymphs, appears to depend on the oil content of the food supplied. Stainers fed on cotton seed immediately after hatching for any time

between five and ten days can reach the adult stage on any part of the boll. Insects feeding on the skin of the boll showed a preference for the inner side. When fed only on green bolls from the time of hatching they cannot reach the adult stage. Preference appeared to be shown for the seed of the old boll and the lint of the younger one.

Amongst other cotton pests only slight damage was recorded by *Alabama argillacea*, *Nezara viridula*, *Eriophyes gossypii*, which was more prevalent than in the previous year, *Saissetia nigra* (black scale), *Hemichionaspis minor* (white scale), and a small mealy-bug.

Diatraea saccharalis, *Metamasius* (*Sphenophorus*) *sericeus*, and mealy-bugs were found in sugar-cane, but did not cause much injury. The latter were also found on cacao, together with *Heliothrips rubrocinctus*, which was more common than in the previous year. *Euscepes* (*Cryptorrhynchus*) *batatae* was found in fields of over-ripe sweet potatoes, and *Tetranychus telarius* (red spider) occurred on the foliage, causing loss of some leaves. *Rhynchophorus palmarum* (palm weevil) caused the death of a few coconut trees, and *Aleurodicus cocois* and *Aspidiotus destructor* were commonly found on them. *Aspidiotus hartii* was common on yams, and *Fundella* (*Ballovia*) *cistipennis* attacked the pods of pigeon and cow peas, causing some damage. *Cosmopolites sordidus* (black weevil borer) caused a fair amount of damage to bananas.

The legislation in connection with imported plants and the cotton industry since 1906 and 1911 respectively is briefly reviewed.

PICARD (F.). **Note sur la biologie de** *Melittobia acasta*, **Walk. (Hym. Chalcididae.).**—*Bull. Soc. ent. France*, 1922, no. 19, pp. 301–304. Paris, December 1922.

The Chalcid, *Melittobia acasta*, Wlk., is remarkable for its sexual dimorphism. The females enter the nests of *Bombus* spp. and other Hymenoptera and oviposit on the pupae or larvae after the cocoon is spun; they also enter the ground, searching for pupae of Diptera, *Musca domestica* and Tachinids. The males do not leave the galleries in which they originated, generally remaining within the cocoon, and are much less numerous than the females. Although few in number, they destroy each other almost to extermination by fighting. The author has reared *Melittobia* on pupae of ants. Workers who have previously obtained this Chalcid from puparia of Tachinids have questioned, in view of the difference of host, whether it was not a different species from the one known to parasitise Hymenoptera, but this is evidently not the case. The author has continuously reared the species on various species of *Formica*, on *Lasius* spp. and on *Musca domestica*, while adults have been fed and have oviposited upon pupae of *Pieris brassicae*. About 100 eggs are laid by each female, of which about five per cent. are males. Unfertilised females produce only males.

The Colorado Beetle Order of 1922.—*Jl. Minist. Agric.*, xxix, no. 11, p. 1069. London, February 1923.

In consequence of the presence of the Colorado potato beetle [*Leptinotarsa decemlineata*, Say] in the Bordeaux region of France, an Order, that came into operation on 1st February 1923, has been issued by the Ministry of Agriculture and Fisheries, under the Destructive Insects and Pests Acts of 1877 and 1907, which prohibits the landing in England

or Wales of any living plants or vegetables from any port in France, unless the landing is authorised by a licence issued by an inspector of the Ministry, or unless the consignment is accompanied by a declaration, signed by the grower or exporter, stating that the plants were not grown in certain specified French Departments.

Colorado Potato Beetle in France.—*Jl. Minist. Agric.*, xxix, no. 11, pp. 1053–1056. London, February 1923.

In view of the establishment of the Colorado potato beetle [*Leptinotarsa decemlineata*, Say] in the Bordeaux region of France, the chances of its introduction and establishment in Great Britain are discussed. A slight outbreak in Tilbury in 1901–1902 proved that this beetle can withstand the English winter climate, and all evidence points to the fact that European conditions are suitable to it. Judging from experience in America, it is estimated that the losses to be expected from the establishment of the beetle would be the cost of spraying the crop with lead arsenate, etc., twice a year. This measure, while sufficient to prevent further loss, is unlikely ever to exterminate the pest, and it would have to be accepted as part of the normal routine of potato growing. It is obvious that every effort should be made to prevent the introduction of imports that are likely to carry the beetles, and for this reason the foregoing embargo has been placed on living plants and vegetables from France. This should be particularly effective in the spring or early summer, when the beetles are flying actively and seeking for shelter and fresh food.

MILLER (D.). **The Olearia Bud-gall Midge.**—*N.Z. Jl. Agric.*, xxv, no. 6, pp. 340–344, 7 figs. Wellington, 20th December 1922.

Galls on the shrub, *Olearia forsteri*, are caused by larvae of *Cecidomyia oleariae*, Mask. In early spring there is a large flight of the midges, their numbers decreasing towards the end of November. Eggs are deposited on the buds of the developing shoots, and the larvae feed on the juices of the plant and pupate in the gall. There is apparently only one generation a year. Control is a difficult matter. The best method would be to cease to plant *O. forsteri* and *O. furfuracea* as ornamental shrubs and to grow other species that are not infested by this midge. A spray of Black-leaf 40 (1 in 800) in the spring might reduce infestation, but it would have to be applied at least two or three times a week to be effective.

HARTLEY (E. A.). **Some Bionomics of** *Aphelinus semiflavus* **(Howard) Chalcid Parasite of Aphids.**—*Ohio Jl. Sci.*, xxii, no. 8, pp. 209-236, 1 plate, 2 figs., 4 tables. Columbus, Ohio, June 1922. [Received 6th February 1923.]

Aphelinus semiflavus, How., is one of the few species of its genus known to attack Aphids. The only other described species for North America recorded as Aphid feeders are *A. mali*, Hald., *A. nigritus*, How., *A. flaviceps*, How., *A. lapisligni*, How., *A. varicornis*, Gir., and *A. automatus*, Gir. The author has also taken two new species, which are being described. These parasites, so far as is known, are limited to Aphids as hosts, and most of them are confined to a few species. *A. mali* was long considered an exception, appearing many times in

records as a scale parasite, but Dr. Howard now believes this to be an error, and considers that it is probably confined to Aphids, and perhaps only to the woolly forms, especially *Eriosoma lanigerum*, Hausm.

A. semiflavus appears to have an extensive distribution, at any rate in the United States. Practically all records show that it appears late in the summer and autumn, and weather conditions seem to have a considerable influence on activity and development. Where conditions are favourable it will multiply throughout the year, the generations following each other in cycles of 20–30 days, depending largely on temperature.

A distinct preference is shown for the younger stages of Aphids, and the older stages are seldom, if ever, attacked. Notes on oviposition and tables showing the percentage of parasitism in the various instars of the host are given. Observations indicate that one egg only is placed in a host, and the parasite appears to be unable to ascertain whether the host has already been parasitised or not. A graph is given showing the number of eggs deposited per day and per night for a given period. The commonest means of sustaining life in the adult parasite is its habit of feeding at the puncture holes made by the ovipositor in young Aphids. This habit seems to be common amongst Chalcid parasites in general. Oviposition appears to be the primary object in puncturing a host, and feeding to be a secondary, acquired habit. This habit defeats the parasite's purpose, as it kills the host and prevents the development of the egg after deposition. It has been found from experiments that a single parasite kills three to five of the smaller instars in a day.

The length of the adult stage varies according to temperature and the food available. Confined without food on plants alone and amongst older Aphids on plants the adults live less than four days; on honeydew they live 12 days, and one individual was kept alive for 39 days on honey solutions in distilled water given fresh every day. There is reason to believe that they will live much longer than this. The prevailing method of reproduction in *A. semiflavus* is by parthenogenesis, males being quite rare.

A description is given of all stages. The egg stage lasts nearly three days. The only actual count made of the number laid by one individual in the course of its life was 507, and from other partial counts this appears to be rather more than the average. The larval period varies from six to eleven days, or longer at low temperatures. The usual time from egg deposition till the host turns black and is killed was nine to ten days. Pupation began within two days after the host turned black, and by the end of three days the last larval skin was cast and the full pupal form assumed. It was found that it took two days longer for an adult Aphid to turn black than for a third instar nymph, and one day longer for a first instar nymph than for a third instar. This would seem to indicate that the medium instars furnished optimum conditions for the development of the larva. The average length of the pupal stage is seven to eight days, but it may vary between five and fifteen days or even longer under adverse conditions. There is every reason to believe that the parasite hibernates in this stage. When the larval parasite hatches, it feeds on the fat-body and developing young of the host, and nearly all the latter are destroyed after three or four days. Experiments were undertaken to determine the effect of parasitism in the various instars on their subsequent maturity and production of young. From these it would appear that

those Aphids parasitised in the second instar seldom mature and produce young, while those parasitised in the third instar may mature and produce several young before they are killed. In a few cases where adult Aphids were parasitised after they had begun to produce young, the production continued six days from the time the parasite's egg was deposited. During this time two females produced 25 young. The parasite may also disturb the production of young in Aphids by worrying or exciting the viviparous females, but the preference for the younger stages is of marked significance as a factor in their control, as it does not attack the source of production, the adult female. This may be one of the factors that make *Aphidius* a much more effective parasite.

Myzus persicae was used as the host in nearly all the experiments. This is the preferred host, but others are *Aphis gossypii*, Glover, *A. maidis*, Fitch, *Chaitophorus viminalis*, Mon., *Macrosiphum granarium*, Kirby, *Acyrthosiphon* (*M.*) *pisi*, Kalt., *Macrosiphoniella* (*Macrosiphum*) *sanborni*, Gillett (rarely), and *Anuraphis viburnicola*, Gill. Several unsuccessful attempts were made to rear *A. semiflavus* in *Aphis rumicis*.

From experiments to determine to what extent the primary Aphid parasites, *Aphelinus* and *Aphidius*, occurred in the same host and the ultimate outcome of such occurrence, it was practically established that for the younger instars at least *Aphidius* would always dominate regardless of whether it came before or after *Aphelinus* in the same host, and if the latter species came a day after *Aphidius* its eggs would never hatch. The death of *Aphelinus* may possibly be brought about by cannibalism, starvation, by a toxic substance thrown off by *Aphidius*, and lack of oxygen. Since *Aphidius* is the more efficient parasite of the two, there is little to fear from the fact that it will kill *Aphelinus*, and the Aphids parasitised by the latter would not interfere with *Aphidius*.

BEQUAERT (J.). **Ants in their diverse Relations to the Plant World.** —*Bull. Amer. Mus. Nat. Hist.*, xlv, pp. 333-583, 4 plates, 23 figs. New York, 20th October 1922.

This is a continuation of a work previously noticed [*R.A.E.*, A, xi, 46], and is an attempt to summarise present knowledge of the widely varied and often intricate relations existing in nature between ants and vegetation. Investigations into the anatomy of myrmecophytes have shown that the whole subject needs thorough revision, and the author is convinced that the ultimate solution of many of the problems involved can only come from close co-operation between botanical and entomological experts.

The phases of the subject dealt with include the various relations between ants and vegetation, a review of African myrmecophytes and a synopsis of recorded myrmecophytes. The bibliography appended has been made as complete as possible.

PERRIER DE LA BATHIE (E.). **Les Insectes des Orgues.**—12 pp., 1 plate, 1 fig. Ugine (Savoie), published by the author, 1922. Price *Fr.* 6.

A list is given of the insects found attacking organs, the principal pests being Coleoptera that damage the woodwork, while Lepidoptera frequently infest the felt. The remedies advocated by the author for each pest are enumerated.

RIQUELME INDA (J.). **La Nicotina como Insecticida.** [Nicotine as an Insecticide.]—*El Agricultor Mexicano*, xxxix, no. 1, pp. 13–16. C. Juarez Chih., Mexico, January 1923.

Information is given on nicotine or tobacco extract, the methods for obtaining solutions of various percentages, and the procedure to be followed in spraying or in fumigating.

DEGRULLY (L.). **Traitements contre l'altise** [*Haltica ampelophaga*].—*Progrès agric. & vitic.*, lxxix, no. 7, pp. 149–153. Montpellier, 18th February 1923.

Measures against *Haltica ampelophaga* on vines, in order to be at all efficient, must be started as soon as growth begins and the first insects appear. Sodium arsenate is the remedy recommended for preference, and provided that not more than ¾ to ⅘ lb. of anhydrated sodium arsenate is used there should be no damage to the crop. For greater safety, however, calcium arsenate or lead arsenate may be used, or pyrethrum-soap or nicotine, for which formulae are given. If larvae are present in numbers, powdered insecticides are recommended, such as 1 part of pyrethrum to 3 of sulphur, or, if this is too expensive, equal parts of precipitated sulphur and finely sifted lime. Directions for the correct use of this are given.

SILVESTRI (F.). **A New Species of** *Termitaphis* **(Hemiptera-Heteroptera) from India.**—*Records Indian Mus.*, xxii, no. 2, pp. 71–74, 3 figs. Calcutta, August 1921.

Termitaphis annandalei, sp. n., is described from Orissa, where it was taken in nests of *Coptotermes heimi*, Wasm., in the trunk of *Ficus bengalensis*.

KLEINE (R.). **Die Runkelfliege** (*Pegomyia hyoscyami*, **Panz.) und die landwirtschaftliche Praxis.** [The Beet Fly, *P. hyoscyami*, and Agricultural Practice.]—*Blätter Zuckerrübenbau*, xxx, no. 1, pp. 1–23, 10 figs. Berlin, 31st January 1923.

The beet fly, *Pegomyia hyoscyami*, Panz., is the chief pest of beet in northern Germany. Its original food-plants are Chenopodiaceae, and as *Chenopodium album* is found throughout Pomerania it must occur everywhere, though the island of Rügen and the adjacent mainland districts are chiefly affected. The infestation depends on the temperature during the year and at the end of the preceding year. It is not a question of the weather over short periods, but of the gradual accumulation of warmth in the lower strata of the ground. The fact that reproduction immediately follows emergence seems to indicate that the pupa hibernating in the ground contains a fully developed adult. The first adults of the succeeding generations were observed on 24th May, 23rd June, and about mid-August respectively; the females of the last oviposited at the end of August, some of the resultant larvae being still present on 18th October, though the majority had entered the ground early in that month. The larvae usually pupate at a depth of 4–6 inches. No parasitised individuals were found, though it is evident that parasitism must occur.

Though chiefly found on Chenopodiaceae, this fly also infests Solanaceae, such as henbane (*Hyoscyamus niger*), from which it was originally described, and *Datura stramonium*. Plants of the genera *Atriplex* and

Spinacia are also much infested. The injury done by the first generation to young beets sometimes leads to the field being ploughed under. The second and third generations do less harm, as the plants are much older, but the injury is more obvious because the leaves are larger and turn brown. The third generation reduces the fodder-value of the leaves.

Up to the present *P. hyoscyami* has resisted all attempts to combat it. Spinach, commonly used as a trap-crop, failed in 1922 to attract the larvae. The most important practical measure is the keeping of the fields free from *Chenopodium album*. The correctness of the practice of late sowing, which is often adopted, is confirmed. The minimum warmth needed by *P. hyoscyami* is soon reached, so that in normal or advanced springs the fly appears before beet is sown and has no opportunity for ovipositing on it. In such cases it maintains itself on *Chenopodium*.

CHEYSSIAL (M. A.). **Expérimentation de la méthode de d'Hérelle en Guinée française pour la destruction des Acridiens.**—*Ann. Med. & Pharm. colon.*, xx, no. 3, pp. 341–346. Paris, September-December 1922.

An attempt has been made in French Guinea to destroy swarms of locusts by means of *Coccobacillus acridiorum* sent from South America for the purpose. Having increased the virulence of the bacillus by successive passages through the insect, the locusts infesting some gardens were sprayed with the culture, and numbers were found to be killed by the disease. Further spraying in other localities also gave good results, and when the virulence of the bacillus was considered to be at its maximum, tubes of the culture were sealed and kept for use in the campaign of 1923. The actual species against which the treatment was directed has not been determined, but it was a small migratory one, probably *Dociostaurus* (*Stauronotus*) *maroccanus* or *Calliptamus* (*Caloptenus*) sp. The spraying should be begun about January or February, after the first or second moult, when the insects are feeding voraciously. The organisation of a successful anti-locust campaign is discussed. It is thought that *Coccobacillus acridiorum* could also be used with good effect against various other insects, particularly termites.

MAUBLANC (A.). **La Mosaïque de la Canne à sucre.**—*Agron. Colon.*, no. 61, pp. 1–7. Paris, January 1923.

The mosaic disease of sugar-cane is discussed, and the part played by insects (in particular *Aphis maidis*) in its transmission is briefly described.

MOREIRA (C.). **Os insectos damninhos. xxvii. A lagarta do fumo,** *Protoparce paphus*, **Cram., e o besourinho dos charutos,** *Lasioderma serricorne*, **Fab.** [Injurious Insects. xxvii. The Tobacco Caterpillar, *Protoparce paphus*, and the Cigar Beetle, *L. serricorne*.]—*Chacaras e Quintaes*, xxvii, no. 1, pp. 17–18, 2 figs. S. Paulo, 15th January 1923.

The chief pest of tobacco in the field in Brazil is a Sphingid moth, *Protoparce paphus*, Cram., against which hand collection of the larvae is advised. Unless very carefully packed, leaf and manufactured tobacco, such as cigars, are attacked by the Anobiid beetle, *Lasioderma*

serricorne, F. The adults may be killed by fumigation with pure carbon bisulphide or by exposure to a temperature of 60° C. [140° F.], while the eggs may be destroyed by passing a steam-blast over the leaf.

AULLÓ (M.). **Experiencias sobre aclimatación de insectos parásitos.** [Experiments on the Acclimatisation of Parasitic Insects.]—*Revista de Montes*, 1922, p. 520. (Extract in *Bol. Soc. Ent. España*, v, no. 8–9, pp. 145–146. Zaragoza, November–December 1922.)

In the laboratory, specimens of the Ichneumonid, *Listrognathus hispanicus*, Szpl., obtained from cocoons of *Zygaena occitanica*, Will., not only fed and reproduced, but attacked larvae that were spinning their cocoons and developed within them. Larvae that had not reached this stage were not attacked. A Chalcid, *Schedius vinulae*, Masi, that parasitises the eggs of *Malacosoma neustria*, L., produced five generations from the beginning of July to the end of August. The fifth generation hibernated. Negative results have hitherto attended attempts to induce it to adapt itself to *Porthetria* (*Lymantria*) *dispar*, L.

In the field, attempts are being made to check *P. dispar*, which infests oak woods, by means of another Chalcid egg-parasite, *Anastatus bifasciatus*, Fonsc.

FRIEDERICHS (K.) & BALLY (W.). **Résumé van een publicatie over de parasitische schimmels van den bessenboeboek.** [Résumé of a Publication on the Parasitic Fungi of the Coffee Berry Beetle.]—*Meded. Koffiebessenboeboek-Fonds*, no. 5, pp. 78–80. Soerabaya, December 1922.

This is a résumé of a full report to be published on the fungi attacking the coffee berry beetle, *Stephanoderes hampei*. The commonest species, and the one forming white patches on infected berries, is *Botrytis stephanoderis*; the less common *Spicaria javanica* occurs on larvae inside the blackened berries, and, like *B. stephanoderis*, is able to kill the adult beetles, which succumb in a short time after they become infected. By means of artificial infection it is possible to establish these fungi in places where they do not naturally occur, but hitherto it has not been possible to increase a natural infestation by the artificial addition of spores, and the fungi do not spread to any marked degree from the focus of infection.

VAN HALL (C. J. J.) & RUTGERS (A. A. L.). **Rapport over eenige proefnemingen met het middel van Davelaar op de ondernemingen Tambak-Kebonso en Melambong.** [Report on some Trials of the van Davelaar Method on the Estates of Tambak-Kebonso and Melambong.]—*Meded. Koffiebessenboeboek-Fonds*, no. 5, pp. 81–84. Soerabaya, December 1922.

On one estate an estimated infestation of one per cent. by *Stephanoderes hampei*, Ferr., was noticed after the employment of van Davelaar's method of smearing with a mixture of one part petroleum and six parts axle grease [*R.A.E.*, A, x, 507, 602], as compared with an estimated infestation of 25 per cent. in the previous year. This is an indication of the usefulness of this method under the special conditions on the estate in question, where young (three to five year old) Excelsa coffee not yet in full bearing was growing, with definite intervals between the crops.

On another estate, with Robusta coffee in full bearing, it was impossible to say if the treatment had had a beneficial effect. It had not prevented a severe general infestation. Only one application of the mixture was made, applications repeated at intervals of two months being impracticable in Java owing to the amount of labour required.

RUTGERS (A. A. L.). **De Koffiebessenboeboek op Sumatra's Oostkust. Voorloopige mededeeling.** [The Coffee Berry Beetle on the East Coast of Sumatra. Preliminary Communication.]—*Meded. Koffiebessenboeboek-Fonds*, no. 5, pp. 85–89. Soerabaya, December 1922.

Since its introduction into Sumatra in 1918, *Stephanoderes hampei*, Ferr., has spread throughout the east coast. In this district coffee (usually Robusta and seldom Liberia) is grown as a catchcrop for rubber and oil palm. Coffee berries are harvested throughout the year. Whereas in Java only five per cent. of the crop is plucked in the five months between two crops, this figure is 35 per cent. on the east coast of Sumatra.

Measures that have been tried against the coffee berry beetle include plucking at shortened intervals, which proved a very expensive method and did not have any apparent effect on infestation. Van Davelaar's method is impracticable owing to the amount of labour required, though it may be of use in plantations that are slightly infested. A radical method, consisting of "rampassen" [*R.A.E.*, A, i, 57; x, 506] and very severe pruning back—a combination resulting in the complete removal of the beetles—has proved to be the only effective measure on severely infested estates.

FRIEDERICHS (K.). **Verslag over een reis naar Sumatra's Oostkust.** [Report on a Journey to the East Coast of Sumatra.]—*Meded. Koffiebessenboeboek-Fonds*, no. 5, pp. 90–93. Soerabaya, December 1922.

Stephanoderes hampei, Ferr., is more dangerous in Sumatra than in Java. The work of "rampassen" and severe pruning seems to have reduced and checked the infestation in a number of instances, but it is not certain that the results will be lasting. The pruning (which produces a shape of bush favourable to the picking up of fallen berries) is not always advisable culturally. Such collection of berries is one of the measures that must follow the two mentioned above, but it is not always possible to pick out all the berries from heaps of rubbish. It is best to keep the rubbish in heaps, and fresh amounts should be searched for berries and then added to an existing heap, because rotting is more rapid in large heaps. Much has been attempted to prevent the development of the beetles during transport of the harvested berries, but not always successfully. One estate uses a double bag, the outer one being smeared with rubber dissolved in benzine; this effectually prevents the escape of the beetles. Quillou coffee suffers most, and Robusta coffee more so than some varieties of Liberia, which, though it may be quite as strongly infested, is less damaged. Such coffees as Kawisari hybrids, Liberia and Excelsa are recommended. Clean weeding and the avoidance of green manures are certainly advantageous as regards the beetle, but in actual coffee plantations there is a danger of impoverishing the ground. The danger is less if coffee is only a catch crop.

GANDRUP (J.). **Over het binnendringen van den bessenboeboek in het Banjoewangische.** [The Entrance of the Berry Beetle into the Banjoewang District.]—*Meded. Koffiebessenboeboek-Fonds*, no. 5, pp. 94–96. Soerabaya, December 1922.

Little is known of the manner in which *Stephanoderes hampei*, Ferr., spreads into new areas, but observations on its occurrence in a district to which access is limited to certain routes owing to geographical conditions seem to indicate that it was introduced by workers from outside areas and spread by means of the baskets, etc., used in harvesting.

De sluipwesp in Uganda.—*Meded. Koffiebessenboeboek-Fonds*, no. 5, pp. 97 & 101–102. Soerabaya, December 1922.

If satisfactory results are reported from Uganda in connection with the Hymenopterous parasite of the eggs and larvae of *Stephanoderes hampei*, Ferr. [*R.A.E.*, A, xi, 32], it is proposed to attempt its importation into the Dutch East Indies.

Bestrijding van den boeboek door bespuiten der bessen met latex of watervaste lijm. [Combating the Coffee Berry Beetle by Spraying the Berries with Latex or Waterproof Glue.]—*Meded. Koffiebessenboeboek-Fonds*, no. 5, pp. 98–99. Soerabaya, December 1922.

The spraying of coffee berries with rubber latex or waterproof glue has been tried, with some effect. The latex flows into the hole made by *Stephanoderes hampei*, Ferr., and covers the beetle with a film of rubber. In one experiment 66 per cent. of the borers were immediately killed and a further 20 per cent. died later. Further tests are, however, necessary before a definite recommendation of this method can be made.

KUYPER (J.). **Een nog niet als plaag voor het suikerriet beschreven slakrups (Limacodida).** [A Limacodid Caterpillar not yet described as a Pest of Sugar-cane.]—*Meded. Proefst. Java-Suikerind.*, 1922, no. 11, pp. 457–463, 3 figs. Pasoeroean, 30th September 1922.

In May 1922 injury to sugar-cane leaves was caused by the larvae of a Limacodid moth, *Thosea* sp., very similar to *T. cervina* occurring in British India. Apparently the same species had been noticed eight years previously, a fact pointing to its very restricted spread. The infestation is quite temporary and the damage done unimportant.

TRÄGÅRDH (I.). **Skogsentomologiska Bidrag. I.** [Forest-Entomological Contributions. I.]—*Medd. Stat. Skogsförsöksanst.*, xix, no. 3, pp. 361–384, 11 figs. Stockholm, 1922. (With a Summary in German.)

The Cerambycid, *Xylotrechus rusticus*, L., was found in aspen and birch, the only definite previous record being from beech. The attacked birches were all standing trees that had been injured by fire or by *Scolytus ratzeburgi*, whereas the aspens were always trees lying on the ground. In the birch the larval mines occur between the bark and the sapwood, only the pupal chamber being in the wood. In the aspen the mines are found both beneath the bark and deep in the trunk.

Plagionotus arcuatus, L., occurs wherever oaks are growing, but is found in felled trunks only, infesting all such as have lain unbarked throughout the summer. In one instance a loss of 12½ per cent. on the timber from 297 trunks was experienced. The unbarked oak poles sometimes used as telephone posts are also attacked. Barking in autumn, before the larvae pupate, and leaving the trunks in shady places are advised.

P. detritus, L., is as widespread as the preceding species, but seems rarer. It is not known whether its life-history differs.

Aromia moschata, L., is generally believed to infest only broken portions of old willow trunks, but has been noticed in perfectly healthy willows, and is thus a primary pest of which the later generations continue living in the damaged trunk.

Anthonomus varians, Payk. (pine blossom weevil) is usually called the pine bud weevil in Germany, but the adult injures the needles, while the larva develops in the male blossoms. The author has never found the larva in ordinary buds. In feeding, the adult drills a row of holes in the needle, the tip of which withers and falls off.

MAAG (R.). **Ueber Obstbaumkarbolineum und andere Winterspritzmittel.** [Fruit-tree Carbolineum and other Winter Sprays.]—*Schweiz. Zeitschr. Obst- u. Weinbau*, xxxii, no. 3, 10th February 1923, pp. 53–54.

The two winter sprays that are of real practical value to the fruit grower are lime-sulphur and fruit-tree carbolineum of a reliable brand, which is very effective against the apple maggot [*Cydia pomonella*], the apple blossom weevil [*Anthonomus pomorum*], woolly aphis [*Eriosoma lanigerum*], scales, Aphids, mites and winter moth [*Cheimatobia brumata*]. There are other materials quite as effective, but they are more expensive than carbolineum.

BOUVIER (E. L.) & LESNE (P.). **Un Ennemi des Epicéas dans la région parisienne.**—*C.R. Acad. Agric.*, 1922, pp. 826–830 [Paris], 1922. (Abstract in *Rev. Bot. app. & Agric. colon.*, iii, Bull. 17, p. 76. Paris, 31st January 1923.)

Norwegian spruce, particularly in the Vosges and Jura regions, is frequently attacked by Scolytids. *Polygraphus pubescens* has been found attacking apparently healthy trees near Paris. In order to limit the damage as far as possible, infested trees and all dead ones should be cut down and burnt entirely. In forest regions it is a mistake to burn only the branches and bark, as this allows a certain number of the insects to escape. Sickly trees in the vicinity should also be cut down, and as soon as they are sufficiently infested they should be burnt.

Amendment No. 2 to Regulations governing the Importation of Potatoes into the United States (Revised).—*U.S. Dept. Agric.*, 2 pp. multigraph. Washington, D.C., 17th January 1923.

Regulation No. 7 of the regulations issued 22nd December 1913 was modified by Amendment No. 1 of 20th June 1922. This is now superseded by Amendment No. 2, effective from 1st February 1923. Potatoes from any foreign countries may be imported into Hawaii and Porto Rico for local use only, free from restrictions. Potatoes grown in Canada and Bermuda may be imported into the United States without permit when accompanied by a certificate from the country concerned

indicating the locality where grown and apparent freedom from injurious potato diseases and insect pests. Such importations shall be subject to such inspection on arrival as may be required by the United States Department of Agriculture. Potatoes may be imported from the States of Chihuahua and Sonora and the Imperial Valley, Lower California, Mexico, into the United States subject only to certain specified conditions.

Withdraws Restrictions on Import of Potatoes from Canada and Bermuda.—*U.S. Dept. Agric.*, 1 p. multigraph. Washington, D.C., 13th February 1923.

The entry of potatoes into the United States from Canada and Bermuda is now permitted without restriction other than such inspection as shall be deemed necessary from time to time to determine the freedom of such imports from injurious diseases and insect pests. This withdrawal of Amendment No. 2 [see preceding abstract] is dated 13th February 1923.

SPEARE (A. T.). **Natural Control of the Citrus Mealybug in Florida.**—*U.S. Dept. Agric.*, Bull. 1117, 18 pp., 1 plate, 2 figs. Washington, D.C., December 1922.

Pseudococcus citri, Risso (citrus mealy-bug) is widely distributed in Florida and the Gulf States. On the whole in Florida it is considered a pest of secondary importance, while in California it is regarded as one of the most serious pests. The object of this paper is to show why in Florida it is usually unimportant, and to point out that a knowledge of its natural enemies is of direct economic value to citrus growers. Environmental factors in Florida are favourable to the development of fungi that destroy injurious insects.

During 1920 and 1921 the Tineid, *Pyroderces rileyi*, Wlsm., the Pyralid, *Laetilia coccidivora*, Comst., and a Chalcid of the genus *Chrysoplatycerus* have been associated with mealy-bugs, and brief notes on these three natural enemies are given. A fungus, *Entomophthora fumosa*, sp. n., which is the chief factor in natural control, is described; it was taken in 1917 on *P. citri* on fig in Lancaster County, but was first observed in Florida in 1920. The symptoms of the disease caused by this fungus and observations on it in citrus groves during 1920 and 1921 are recorded. In studying a mealy-bug infestation during June to August it was noted that the maximum abundance of young insects was also the period in which the percentage of diseased individuals rose abruptly from 18 to 64, and following this sudden increase in mortality the young insects became less and less numerous. Data to determine the prevalence of the fungus at various periods of the season show that of the first collection on 13th June only 11 per cent. died of the disease, whereas in the last collection 94 per cent. succumbed. It is reasonable to believe that such widespread destruction of the mealy-bug has been going on for years unobserved by citrus growers.

From spraying experiments it has been shown that unsprayed trees are in better condition than sprayed ones, as fungicides, with the possible exception of lime-sulphur, prevent the development of the fungus. In rare instances only will it pay to employ such artificial measures. Endeavours should be made to introduce the fungus as soon as possible in the spring. It is known that *P. citri* can be cheaply and successfully grown on potato sprouts, and it should be a simple matter to propagate

the fungus amongst a large number of insects. In California *Iridomyrmex humilis*, Mayr (Argentine ant) and other ants are said to be important factors in checking the work of natural enemies, but they have been frequently observed in Florida, and it is difficult to see how they can interfere with a fungous parasite.

LUGINBILL (P.). **The Southern Corn Rootworm and Farm Practices to control it.**—*U.S. Dept. Agric.*, Farmers' Bull. 950 (revd. edn.), 10 pp., 8 figs. Washington, D.C., May 1922. [Received 13th February 1923.]

The contents of this bulletin on the southern corn rootworm, *Diabrotica duodecimpunctata*, and measures against it are substantially the same as one already noticed [*R.A.E.*, A, vii, 3], though more particulars are given as to the periods when maize should be planted in infested lowlands.

MILLIKEN (F. B.). **The False Chinch Bug and Measures for controlling it.**—*U.S. Dept. Agric.*, Farmers' Bull. 762 (revd. edn.), 4 pp., 2 figs. Washington, D.C., July 1922. [Received 13th February 1923.]

This paper on the bionomics and control of the false chinch bug, *Nysius ericae*, Schill., is practically identical with one already noticed [*R.A.E.*, A, v, 145].

MASON (A. C.). **Biology of the Papaya Fruit Fly,** *Toxotrypana curvicauda*, **in Florida.**—*U.S. Dept. Agric.*, Bull. 1081, 10 pp., 2 plates, 1 table. Washington, D.C., July 1922. [Received 13th February 1923.]

In recent years *Toxotrypana curvicauda* (papaya fruit-fly) has assumed greater importance in Florida owing to the increasing cultivation of *Carica papaya* and to the spread of the fly.

The eggs are inserted in clusters of 6 to 20 into the seed cavity of the fruit, and one female can lay 103 eggs, all of which are deposited at about the same time. The eggs are not affected by climatic changes and hatch in 12 to 14 days. The larvae feed on the coating of the seeds, and as they mature eat into the flesh of the fruit. Experimentally this stage varies from 10 to 27 days, with an average of 15. In cool weather it is prolonged, and unfavourable conditions, such as the fruit decaying or the larvae being removed from the fruit, causes pupation to occur before the normal time. If conditions are favourable the larvae may remain in the fruit for several days after reaching maturity. If the fruit has fallen they pupate immediately beneath it at a depth of about two inches, but if still on the tree they drop to the ground. The average number of larvae that infest a single fruit is about 15 or 20. The pupal stage varied from 18 to 44 days. Under favourable conditions of moisture the largest number of adults emerge after 18 to 20 days in hot weather, but in winter between 30 and 40 days on the average. Moisture even more than heat seems to be the determining factor. Under favourable conditions only about 70 per cent. mature. The adults emerge from the soil in early morning just before daylight. The females always seek the shady side of the trees or fruit, and the greatest flight occurs about one hour before sunset; the males are more active on bright days. The average life is about 5 to 7 days. Pairing usually takes place in the daytime on the leaves or fruit, and oviposition

in the evening. The females prefer half-grown or larger fruits and do not often oviposit in fruit where eggs or larvae are already present. The fly occurs in all stages throughout the year in Florida. The flight of the adults is greatest in March and April; they appear on the new fruits in the autumn and continue to breed in increasing numbers in winter and spring. There are about six generations a year. The adults are not strong fliers; one papaya placed two miles from any other plants remained free from infestation during the season. The susceptibility of varieties of papayas to infestation is discussed, but none is entirely immune.

Jumping spiders and small red ants are the only two natural enemies of this pest, but represent a negligible factor in its control.

The most effective measure is bagging the trees or fruits with cheese-cloth or mosquito netting, but this is not practicable on a large scale. The adults may be poisoned with sodium arsenite or potassium arsenate dissolved in brown sugar syrup. Spraying with these soluble poisons causes severe injury to the trees, and insoluble arsenical compounds are not effective against the fly, though they do no injury to the trees. Selection of good seed and production of fruits of oblong shape and thick flesh that will offer more or less immunity from attack, destruction of infested fruits early in the season before the larvae drop to the ground, and destruction of all infested plants and wild plants that may serve as breeding-places, will materially reduce the number of flies. If a plantation is sufficiently isolated from other papayas, the flies may be killed by destroying all the plants in the spring, about April or May, and replanting. The new plants will fruit in the summer or early autumn, but there will be a period of about 60 days with no fruit present, and this is long enough to starve the flies. All wild papaya plants within a radius of two miles should also be destroyed.

MUESEBECK (C. F. W.). *Zygobothria nidicola*, **an important Parasite of the Brown-tail Moth.**—*U.S. Dept. Agric.*, Bull. 1088, 9 pp., 4 figs. Washington, D.C., July 1922. [Received 13th February 1923.]

The introduced Tachinid, *Sturmia* (*Zygobothria*) *nidicola*, Towns., is one of the most effective factors in the control of *Nygmia phaeorrhoea*, Don. (*Euproctis chrysorrhea*, L.) (brown-tail moth) in the United States. The parasite must remain within the area over which the moth occurs, as it is its only host, but within these limits it is widely distributed, though it is less abundant where very low temperatures are reached during the winter. Notes are given on the life-cycle of the host and on the bionomics of the parasite. The adult Tachinids appear during the end of July, and from experimental data it is assumed that their natural life is at least 25 to 30 days. Pairing takes place soon after emergence, and embryonic development requires 7 to 8 days. Oviposition occurs early in August in normal seasons. Larvae from several days to two weeks old are preferred, though those recently hatched are often successfully parasitised. As many as eight eggs have been found on one host, though only one can complete development. After entering the host, the parasite feeds for 10 to 14 days, then hibernates for about nine months, and begins to feed again in late May and early June. It kills the host when the latter is in its cocoon and pupates inside it. This stage lasts 25 to 30 days, and the adults emerge some 8 to 16 days prior to the hatching of the eggs of the moth. The parasite has only one generation a year. This Tachinid is an important

parasite, often infesting 20 to 30 per cent. of its host, although it is always killed if it occurs in association with the two Hymenopterous parasites, *Apanteles lacteicolor*, Vier., and *Meteorus versicolor*, Wesm., which also hibernate in *N. phaeorrhoea*.

WELLHOUSE (W. H.). **The Insect Fauna of the Genus** ***Crataegus***.—*Cornell Univ. Agric. Expt. Sta.*, Mem. 56, pp. 1041–1136, 3 plates, 23 figs. Ithaca, N.Y., June 1922. [Received 13th February 1923.]

The author has made a study during the years 1917–1920 of the insects that feed on *Crataegus* spp. in Central New York, and to this he has added information from other sources concerning insects found on these plants in various parts of the world. Biological notes are given on the insects studied, and a catalogue is appended in which 382 species are listed, representing 9 orders and 55 families. References to the literature concerning the species are included in the catalogue, with brief biological notes.

SEBASTIAN (V.). **Le Doryphora de la Pomme de Terre.**—*Rev. Agric. Afrique du Nord*, xxi, no. 184, pp. 92–94. Algiers, 9th February 1923.

An account is given of the recent appearance of the Colorado potato beetle [*Leptinotarsa decemlineata*, Say] in Bordeaux and its neighbourhood; and the necessity for taking every precaution to prevent its introduction into Algeria is pointed out. The legislation to which the infestation has given rise is quoted.

HARING (C. M.). **Entomology and Parasitology.**—*Univ. Cal. Rept. Coll. Agric. & Agric. Expt. Sta., 1921–22*, pp. 81–88, 2 figs. Berkeley, Cal., 1922.

The entomological work undertaken during 1921–22 in California here recorded has already been noticed from other sources, chiefly from the Journal of Economic Entomology.

Potato Diseases.—*Cyprus Agric. Jl.*, xviii, pt. 1, pp. 27–28. Nicosia, January 1923.

Phthorimaea operculella (*Lita solanella*) (potato moth) continued to cause damage to potato crops during 1922. Suspected seed, before sowing, and plants, when the larvae first appear on the leaves and stems, should be sprayed with Bordeaux mixture or Paris green.

SHEMBEL (S. Iu.). **Отчет о деятельности Астраханской Станции Защиты Растений от вредителей за 1921 год.** [Report of the Astrakhan Station for the Protection of Plants from Pests for 1921.] pp. 1–15. Astrakhan, 1922. (With a Summary in German.)

The following pests are recorded as new to the Astrakhan district during 1921:—*Aphthona* sp. and *Pyrrhocoris apterus* on pumpkins; larvae of *Phragmatobia fuliginosa*, causing serious damage to beet; *Agrilus* sp. on basket willow; *Lycaena* sp. on *Acacia*; and another species of *Lycaena* on *Phaseolus vulgaris*.

Among the usual pests the most damage was caused by *Cydia* (*Carpocapsa*) *pomonella* and *Eurydema ornatum*, the latter particularly to young cabbages. Owing to the abundance of the parasite *Aphidius*, *Brevicoryne* (*Aphis*) *brassicae* was less abundant than in the previous year. As a result of the activities of *Apanteles glomeratus*, *Pieris brassicae* has almost disappeared, but *P. rapae* occurred in large numbers.

Other miscellaneous pests were *Loxostege* (*Phlyctaenodes*) *sticticalis*, *Biston hirtarius*, *Porthetria* (*Ocneria*) *dispar*, *Hyponomeuta malinellus*, *H. variabilis* and *Stilpnotia* (*Leucoma*) *salicis*.

NOVAK (S.). **Velké škody na ozimech způsobené larvou hrbáče osenního.** [Injury to Cereals by *Zabrus gibbus*.]—*Ochrana Rostlin*, ii, no. 5–6, pp. 61–62. Prague, December 1922.

A brief account is given of the abundance of *Zabrus tenebrioides* (*gibbus*) causing injury to cereals in Czecho-Slovakia.

MACAL (J.). **Sosnokaz borový.** [*Panolis flammea*, **Schiff.**]—*Ochrana Rostlin*, ii, no. 5–6, pp. 62–63. Prague, December 1922.

Panolis flammea, Schiff., has occurred in unexpected abundance in forests of conifers in Czecho-Slovakia. A brief account is given of the damage caused by the larvae as well as notes on the life-history of this moth [*R.A.E.*, A, viii, 225]. The natural enemies include *Panzeria rudis*, *Ichneumon nigritarius*, *I. pachymerus*, *I. trilineatus*, *I. brachymerus*, *Ophion luteus*, *Carabus*, *Cicindela*, and the fungi, *Entomophthora aulicae* and *Botrytis bassiana*.

PARKER (T.). **The Suppression of Insect Pests and Fungoid Diseases. 2. The Fumigation and Disinfection of Glasshouses.**—*Bur. Bio-Technology*, Bull. 8, pp. 244–248. Leeds, January 1923.

The importance of the thorough cleansing of glasshouses cannot be over-emphasised, and although the processes may be somewhat expensive, growers have proved that in the end they are compensated for by the results. As soon as the particular crop grown is over, the house should be thoroughly fumigated, care being taken to use a fumigant that will not only kill hibernating insects, but also their eggs. It is considered doubtful whether cyanide gas, nicotine and the commoner fumigants fulfil this purpose, but successful results have been obtained with a fumigant, one of the active ingredients of which is a chlorinated nitro compound. After fumigation, all dead haulms, roots and other refuse should be burnt (if possible in an incinerator). The soil should then be sterilised. If it is required to plant another crop at once, soil sterilisation cannot always be done, but it should be practised at least once a year, preferably a fortnight before planting. Sterilisation may be by steam or dry heat or by chemicals applied to the soil, chlorinated compounds, such as chlorcresol, chloropicrin, etc., being much more effective in this connection than ordinary cresylic acid. The house should then be thoroughly disinfected by washing down all interior surfaces with lime wash.

PARKER (T.) & LONG (A. W.). **Spray Spreading Agents.**—*Bur. Bio-Technology*, Bull. 8, pp. 252–258, 2 plates, 6 figs. Leeds, January 1923.

Many materials have been used to increase the spreading of a spray fluid over foliage, including soap, saponine, quillaia bark, glue, borax, etc.

The use of soap is somewhat restricted, owing to the chemical reaction that may take place between it and some of the substances used as insecticides or fungicides. Saponine in many respects gives excellent results, but is far too expensive to be used commercially. This paper describes the results of tests with alkaline caseinates, and particularly calcium caseinate. This greatly increases the wetting and penetrating power of a wash, enabling the active ingredients to come into closer contact with the leaf and with the pest, so that the maximum effect is obtained. A 0·2 per cent. solution of calcium caseinate is approximately the lowest strength that will produce maximum wetting. It greatly retards the settling of lead arsenate from suspension, and appears to increase the insecticidal and fungicidal efficiency of some washes by 100 per cent. when these are compared with similar concentrations in ordinary water. It might be used with great advantage for assisting the penetration of washes employed against woolly aphis [*Eriosoma lanigerum*, Hausm.]. The results of the experiments indicate that a winter wash of lime-sulphur in conjunction with calcium caseinate might be successfully carried out at a dilution of 1 : 40 instead of the usual winter strength of 1 : 20.

MASON (F. A.). **The Greenhouse Grasshopper,** *Tachycines asynamorus*, **Adel. A Pest in Conservatories and Propagating Houses.**—*Bur. Bio-Technology*, Bull. 8, pp. 262–267, 4 figs. Leeds, January 1923.

An Orthopteron that has been causing considerable damage to tomato and *Lobelia* growing under glass in the south-west of London, and was at first thought to be *Diestrammena marmorata*, de Haan (Japanese grasshopper), has been identified as *Tachycines asynamorus*, Adel., a species that has frequently been confused with the former [*R.A.E.*, A, v, 317]. It is probably much more common than is generally supposed, its nocturnal habits preventing detection. Plants that have been seriously injured by it include young shoots of *Begonia*, *Cyclamen*, *Petunia*, *Nicotiana*, *Gloxinia*, *Lobelia*, *Chrysanthemum* and cucumber. When suitable plants are not available, it will also feed on fruit, potatoes, biscuits, etc., and is evidently carnivorous, if not cannibalistic.

THEOBALD (F. V.). **New Species of British Aphides.**—*Ent. Mo. Mag.*, lix, pp. 23–28, 3 figs. London, January–February 1923.

The new species described are *Macrosiphoniella staticis* on sea lavender (*Statice limonium*) near Whitstable; *Amphorophora evansi* on Austrian pine near Edinburgh in company with *Eulachnus agilis*, Kalt., and apparently *Lachnus pini*, F.; and *Aphis parietariae* on *Parietaria officinalis* from Kent and Dorset.

FOX-WILSON (G.). *Otiorrhynchus rugifrons* **and** *O. sulcatus* **as Pests of Alpine Plants.**—*Ent. Mo. Mag.*, lix, pp. 38–39. London, February 1923.

Otiorrhynchus rugifrons, Gyll., and *O. sulcatus*, F., are the chief pests of alpine plants in pots at Wisley, Surrey. Saxifrages are the preferred food-plant, though many others are attacked to a less extent. The life-histories of these weevils appear to be identical. Adults are found in June and July; they eat the foliage, preferring the larger-leaved species. The eggs are laid at the base of the plant among the

dead leaves; they hatch in from two to three weeks, and the larvae feed on the roots from the time of their emergence in July until the following April. Pupation occurs during the latter part of April and early May in earthen cells. The damage was very severe in many cases, the plants being eaten off just below the surface of the soil.

HAWKES (O. A. M.). **Hibernation of Coccinellidae on Mountains.**—*Ent. Mo. Mag.*, lix, pp. 53–55. London, March 1923.

Various records of hibernation of *Coccinella septempunctata* and *Adalia bipunctata* are reviewed. The apparently characteristic habit of some Coccinellids to seek high altitudes for hibernation still remains unexplained.

BAGNALL (R. S.). **A Contribution towards a Knowledge of the British Thysanoptera, with Descriptions of New Species.**—*Ent. Mo. Mag.*, lix, pp. 56–60. London, March 1923.

The new species described are: *Thrips menyanthidis* in flowers of *Menyanthes trifoliata* from Westmorland and Durham; *T. adamsoni* on the same food-plant from Durham; *T. fulvipes* on *Mercurialis perennis* from Oxfordshire; *T. crassicornis* in flowers of *Euphorbia* sp. from Devonshire; and *T. debilis* on heath (*Erica* sp.) from the Isle of Wight.

FLINT (W. P.). **The Control of Household Insects.**—*Illinois Agric. Expt. Sta.*, Circ. no. 257, 24 pp., 15 figs. Urbana, Ill., April 1922, revised November 1922.

A brief account is given of the more common household insects found in Illinois and the most effective measures for their control.

BRITTAIN (W. H.). **Experiments in the Control of the Apple Sucker (*Psyllia mali*, Schmidberger) in the Adult Stage.**—*Sci. Agric.*, iii, no. 6, pp. 212–218. Ottawa, Ont., February 1923.

This information on the control of *Psylla* (*Psyllia*) *mali*, Schmid., by fumigation with waste tobacco has already been noticed elsewhere [*R.A.E.*, A, x, 308].

GARDNER (J. C. M.). **Notes on an Entomological Tour in the United States of America and Canada.**—*Indian Forester*, xlix, nos. 1 & 2, pp. 9–18 & 61–66. Allahabad, January & February 1923.

An account is given of a visit for the purpose of studying the more important projects for the control of forest insect pests in Canada and the United States.

MASSEE (A. M.). **Abnormal leaves of the Himalaya Berry and Raspberry.**—*Gardeners' Chron.*, lxxii, no. 1872, p. 281, 1 fig. London, 11th November 1922.

A mite, not yet identified, is believed to be the cause of abnormal foliage of Himalaya berry and allied plants, such as raspberries. The buds, in many of which a reddish brown mite occurs, are shrivelled and discoloured.

Raspberry Stem Bud Moth.—*Gardeners' Chron.*, lxxiii, no. 1880, p. 11. London, 6th January 1923.

In 1922 *Incurvaria* (*Lampronia*) *rubiella*, Bjerk., was prevalent throughout the north of England. This moth is unfortunately on the increase and has been found in loganberry as well as in raspberry canes. The damage is done in the spring, the larvae feeding on the pith of the earliest buds, causing them to wilt and die. The leaves should be examined several times early in the year, and all infested buds removed and burned.

Green (E. E.). **Supplementary Notes on the Coccidae of Ceylon. Part iv.**—*Jl. Bombay Nat. Hist. Soc.*, xxviii, no. 4, pp. 1007–1037, 39 figs. Bombay, 20th December 1922.

The new species described are:—*Aspidiotus ambalangoda* on an undetermined shrub; *A. calophylli* on *Calophyllum walkeri*; *Aonidia* (*Greeniella*) *columnifera* on *Turpinia pomifera*; *A. mesochitinosa* on *Canthium montanum*; *A. mimusopis* on *Mimusops hexandra*; *Lepidosaphes dilatilobis* on an undetermined shrub; *Pseudoparlatoria pusilla* on cacao (*Theobroma cacao*); *Diaspis antiquorum* on *Euphorbia antiquorum* associated with *Parlatoria mangiferae*, Marl.; *D. bambusae* on *Bambusa*; *D. heneratgoda* on an undetermined tree; *D. orientalis* on *Sapindus* sp. and from India on *Hemigyrosa* sp.; *D. phoenicis* on *Phoenix zeylanica*; *D. mihiriya* on *Dichopsis grandis*; *D. grandilobis* on *Diospyros thwaitesi*; *Fiorinia kandyensis* on an undetermined shrub; *Chionaspis acuminata* var. *atricolor*, n., on *Carissa* and from Southern India on *Carissa* and *Tamarindus*; *Chionaspis gynandropsidis* on *Gynandropsis* sp.; *C. linearis* on bamboo; *C. tenera* and *Parlatoria cingala* var. *namunakuli*, n., on undetermined shrubs; *Lecanium desolatum* on *Ficus gibbosa*; *L.* (*Platylecanium*) *fusiforme* on an undetermined shrub; *L. illuppalamae* on an undetermined tree; *L. ixorae* on *Ixora coccinea*; *L. latioperculatum* on an undetermined shrub, attended by ants (*Oecophylla smaragdina*) and often included in their silken enclosures; *L.* (*Paralecanium*) *limbatum* on *Ixora coccinea*; *L.* (*P.*) *mancum* on *Calophyllum walkeri*; *L. piperis* var. *namunakuli*, n., on *Piper* sp.; *L. tessellatum* var. *obsoletum*, n., on *Myrtus communis*; *L.* (*Paralecanium*) *trifasciatum* on *Hemicyclea*; *L. tripartitum* on *Calophyllum walkeri*; *Lecanopsis ceylonica* at the base of a grass attended by ants; *Exaeretopus farinosus* (doubtfully assigned to this genus) on *Psychotria bisulcata*, parastised by the Chalcid, *Coccophagus flavescens*, How.; *Ceronema fryeri* and *C. iceryoides* on undetermined plants; *Ctenochiton cinnamomi* on *Cinnamomum* sp.; *C. fryeri* on the bark of an undetermined tree; *C. olivaceum* on *Pterospermum suberifolium*; *Lecaniodiaspis mimusopis* on *Mimusops hexandra*; *Asterolecanium gutta* on *Calophyllum walkeri*; *A. loranthi* on *Loranthus neelgheriensis*; and *A. pseudomiliaris* on *Bambusa*.

Additional descriptive notes are given on *Inglisia chelonioides*, Green.

Besides *Parlatoria zeylanica* on bamboo [*R.A.E.*, A, iii, 755], Rutherford also described in the same paper another new species from cinnamon under the same name, for which *P. rutherfordi*, n. n., is suggested.

Sagnier (H.). **La Lutte contre le Doryphora.**—*Jl. Agric. prat.*, xxxix, no. 7, pp. 132–134, 3 figs. Paris, 17th February 1923.

Some photographs are given showing the extensive damage done by the Colorado potato beetle [*Leptinotarsa decemlineata*, Say] in various

fields in the Bordeaux region. Sprays of arsenicals are recommended, lead arsenate having been found the most effective.

WADE (J. S.). U.S. Bur. Ent. **On Entomological Publications of the United States Government.**—*Proc. Ent. Soc. Washington,* xxv, no. 1, pp. 1–32. Washington, D. C., January 1923.

This useful compilation enumerates the entomological publications of the various departments of the Federal Government for the use of entomological workers, and is of especial use with reference to those series not wholly devoted to entomology.

BURKE (H. E.), HARTMAN (R. D.) & SNYDER (T. E.). **The Lead-cable Borer or " Short-circuit " Beetle in California.**—*U.S. Dept. Agric.,* Bull. 1107, 56 pp., 10 plates, 7 tables, 15 figs. Washington, D.C., 4th December 1922.

The most common and serious injury to metal by various insects throughout the world is that caused to the lead sheathing of aerial cables. Bostrychid beetles are the most prevalent and do the most damage in this connection. In California, *Xylopertha* (*Scobicia*) *declivis,* Lec., bores circular holes about 0·1 in. in diameter that penetrate the sheathing and let in moisture, causing short-circuiting of the wires. A brief review is given of the occurrence and extent of injury to cables in the United States by beetles.

X. declivis appears to be widely distributed in California, its principal food-plants being various species of oak. A list of associated insects is given; predatory and parasitic enemies are not common. The Clerid, *Monophylla californica,* Fall, is predatory, and a Histerid, *Teretrius* sp., may be also. Another predacious beetle, *Trogosita virescens,* F., was reared from infested wood; but no Hymenoptera or Diptera were observed in any of the rearings.

Eggs are laid in pores in the wood in a gallery excavated by the female and hatch in 21 days. Healthy wood cut, felled or broken by the wind and down from two weeks to six months is preferred for oviposition. A description is given of the egg. The larvae mine the wood for about nine months and remain in a prepupal stage for about six days. The pupal stage lasts about 14 days, and the adults remain in the wood for 30 days while they harden and mature. After emergence the males get under a bark scale and feed, while the females start the entrance galleries to the new wood, after which pairing takes place. There is only one generation a year. Eggs have been found from May to September, larvae from the end of May in one year to the end of June the next, pupae from March to August, and the adults from April to September, being most common in July and August, with a maximum emergence from 20th to 30th July. The pupae are most abundant from 1st May to 15th June. In an appendix a description by R. D. Hartman of the mature adult is given, and the morphology of the larval stages are described by A. G. Böving.

The experiments undertaken up to the present seem to indicate that the beetle can penetrate any lead alloy used as a cable sheathing or any poison or repellent placed on the sheathing. It is probably able to penetrate the poisons as it does not feed as it bores. Theoretically if any grease or grease compound that will soften in the sun when the beetle is most active is placed on the rings it will stick to the beetle and suffocate it when it tries to bore into the cable. Layers of friction tape impede the boring, and thin sheets of copper, zinc and steel prevent it.

Sleeves of these metals can be placed around the cables at the rings, but the cost would probably be too great for general use. Tallowing the rings is the most promising measure at the present time. In 1921 it was found that the beetles could not penetrate pure gum rubber. No definite results were obtained from experiments with the various types of suspension rings, but captive beetles would not enter at any of them. It is believed that the new type of ring, made of flattened steel-wire stock, galvanised, which is now being installed, is better from the standpoint of beetle attack than the older one. The penetrating ability of the associated insects and a few other species is recorded. A bibliography is given of the insects attacking or penetrating metals and of the biology and taxonomy of *X. declivis*.

JONES (C. R.). **A Contribution to our Knowledge of the Syrphidae of Colorado.**—*Colorado Agric. Expt. Sta.*, Bull. 269, 72 pp., plates. Fort Collins, Colo., April 1922. [Received 19th February 1923.]

A description is given of the following species, with notes on their life-histories and food habits, and the various Aphids on which they are predacious: *Eupeodes volucris*, O.-S., *Syrphus arcuatus*, Fall., *S. americanus*, Wied., *Lasiophthicus pyrastri*, L., *Helophilus latifrons*, Lw., *Allograpta obliqua*, Say, and *Paragus bicolor*, F. The second part of the paper contains keys to the Colorado genera and species of this family with notes on their distribution, and the last part is a catalogue of known Colorado SYRPHIDAE.

The Insect Pest Survey Bulletin.—ii, nos. 1 8, 316 pp. [Multigraph.] [Washington, D.C.] U.S. Dept. Agric. April–November 1922.

This volume, of which the first number has already been noticed [*R.A.E.*, A, x, 331], contains a monthly review of current entomological conditions throughout the United States. A comprehensive index is included on the lines of that noticed for the previous volume [*R.A.E.*, A, x, 276].

KILLICK (C. R.). **Some Aspects of the Pathology of Acarine Disease.**—*Bee World*, iv, no. 8, pp. 169–171, 1 fig. Benson, Oxon., January 1923.

As a result of microscopical study of many bees infected with Isle of Wight disease, the author puts forward the suggestion that the toxic action of the mite [*Acarapis woodi*] is the chief factor causing the death of the bee, and that it acts mainly by paralysing the flight muscles and rendering the bee unable to keep up its own heat and that of the colony, and only secondarily by obstruction to breathing. He is also inclined to think that during flight the chief supply of oxygen to the flight muscles is through the anterior tracheal system.

FERNALD (H. T.) & BOURNE (A. I.). **Injury to Foliage by Arsenical Sprays. ii. Calcium Arsenates and Arsenites. iii. Notes on other Arsenicals.**—*Massachusetts Agric. Expt. Sta.*, Bull. 210, pp. 89–98, 14 figs. Amherst, Mass., August 1922. [Received 20th February 1923.]

Calcium arsenates and arsenites are dealt with in a similar manner to that already noticed for lead arsenates [*R.A.E.*, A, x, 468]. In order to make the tests comparative with lead arsenate sprays, 0·85 lb. of

arsenate (practically pure acid calcium arsenate prepared by the department, and being the amount calculated to give the same amount of arsenic pentoxide) was added to 50 U.S. gals. of a mixture containing 4 lb. of lime. In a general way the same factors determining injury to foliage apply to this substance as to lead arsenates. Pure acid calcium arsenate is, however, unobtainable on the market. Commercial calcium arsenate, though not pure, did not contain substances of a nature or in such amounts as to cause foliage injury. Its effect on peach is about the same as lead arsenate, though in other cases it is slightly more dangerous than the latter, but a little less so than pure acid calcium arsenate, and the range of temperature and humidity combinations at which it is safe are more limited than in the case of lead arsenate. This material cannot be used with the same degree of safety on various trees on the same day; thus it may be perfectly safe to spray apples, when plums, peaches or even cherries would be seriously injured. In all tests 1 per cent. of milk of lime was added; this may, however, prove unnecessary with commercial calcium arsenate, which contains an excess of lime. Further experiments are required before this point can be decided.

Other substances tested were calcium metarsenite, magnesium arsenate and zinc arsenite, all of which proved too dangerous for use on fruit-tree foliage.

THATCHER (R. W.). **Forty-first Annual Report, with the Director's Report for 1922.**—*N. Y. Agric. Expt. Sta.*, 51 pp. Geneva, N.Y., January 1923.

The work carried out by the Division of Entomology during 1922 is summarised on pages 37 to 43, most of this having been dealt with at greater length in the various bulletins and circulars published by the Station.

Report of Committee in Charge of the Experiment Station for the Year ending September 30, 1922.—*Proc. 42nd Ann. Meeting Hawaiian Sugar Planters' Assoc., Nov. 20th–22nd, 1922.* 71 pp. Honolulu, 1923.

There have been no serious outbreaks of leaf-hopper [*Perkinsiella saccharicida*], and the principal development in its control has been the rapid spread of the parasite, *Cyrtorhinus mundulus*, details of which are given, with notes on its effect on other egg-parasites such as *Paranagrus* and *Ootetrastichus*. The New Guinea Tachinid [*Ceromasia sphenophori*] still continues to keep the cane borer [*Rhabdocnemis obscura*] in check. *Anomala* [*orientalis*] is so completely kept in check by *Scolia*, that the damage caused by it is negligible. A search is being made in the countries round the Gulf of Mexico for natural enemies of wireworms, which are troublesome in Hawaii. Aphids on sugar-cane are being controlled by *Micromus vinaceus* (Australian lacewing fly), which is now widely established and abundant in places. *Diomus* and *Nephus* and other mealy-bug parasites have been received from Mexico and liberated. There was an unusual abundance of cutworms during the spring, the infestations being due in many cases to neglected cane fields. The introduced Tachinid and Hymenopterous parasites seemed to be in their usual numbers, but even with the assistance of the mynah bird they failed to effect control. Until further parasites are obtained the following poison bait is recommended: 5 lb. bran, ¼ lb. Paris green or white arsenic, 1 [? U.S.] pint cheap molasses, 1 lemon or orange and 1 [? U.S.] gal. water.

A leaf-mite that has been present in cane fields for some years has now been recognised as *Tetranychus exsiccator*, a species that occurs in Java. This is apparently the first definite record of its occurrence in Hawaii. The larvae and adults of a small black Coccinellid and of a Staphylinid have been found feeding on the mites and their eggs. It is not anticipated that this will prove a very serious pest. Investigations into yellow stripe or mosaic disease have shown that this disease is spread not only by planting diseased seed cane, but that it is carried by the corn aphis [*Aphis maidis*], and that this Aphid transmits the disease from certain other plants to sugar-cane [*R.A.E.*, A, x, 347]. It has now been definitely proved that the centipede, *Mecistocephalus maxillaris*, is responsible for injury to the roots of sugar-cane, hitherto attributed to fungi.

Pleistodontes froggatti and *P. imperialis* have been introduced from Australia to assist fertilisation in trees of the genus *Ficus* and have become established, and there is reason to believe that other desirable fig insects may also be introduced. The establishment of the parasite, *Ischiogonus syagrii*, against the fern weevil [*Syagrius fulvitarsis*] has already been noticed [*R.A.E.*, A, x, 632]. A weevil and a Tortricid moth were introduced from the Philippines, where they attacked nut grass [*Cyperus rotundus*]. Experiments to ascertain if they would attack other plants or crops show that it will be safe to liberate them; but not much can be expected of them, as in the Philippines they only killed about 5 per cent. of the nut grass. Other introduced beneficial insects are Larrid wasps, parasitic on crickets, and Ichneumonids and other Hymenoptera parasitic on larvae of the bean butterfly, from the Philippines, and *Euplectrus* sp., attacking looper caterpillars, from Hong Kong.

WÜNN (H.). **Ueber die Cocciden des Urwaldes von Bialowies.** [The Coccidae of the Primeval Forest of Bialowies.]—Reprint, 21 pp. from *Abh. Senckenberg. Naturf. Ges.*, xxxvii, no. 1. Frankfort-on-Main, 1919. [Received 20th February 1923.]

This record of the COCCIDAE of Bialowies, Lithuania, and their food-plants is the result of 12 days' collecting in 1917, covering the immediate neighbourhood of Bialowies and the adjoining parts of the great primeval forest, which occupies over 400,000 acres.

The 16 species found were *Asterolecanium variolosum*, Ratz., *Eriococcus spurius*, Mod., *Phenacoccus aceris*, Sign., *Aspidiotus abietis*, Schr., *A. ostreaeformis*, Curt., *Chionaspis salicis*, L., *Lepidosaphes newsteadi*, Sulc., *L. ulmi*, L., *Leucaspis candida*, Targ., *L. loewi*, Colv., *Kermes quercus*, L., *Eulecanium (Lecanium) ciliatum*, Douglas, *E. (L.) corni*, Bch., *Eriopeltis festucae*, Fonsc., *Eulecanium (Physokermes) coryli*, L., and *Physokermes piceae*, Schr.

An Aleurodid, *Aleurochiton aceris*, Geoffr., was taken from *Acer platanoides*.

The distribution of the scales is very irregular, being scanty in the forest itself; but this is doubtless due to their dependence on sunlight. The Coccid fauna of the forest agrees with that of Central Europe and may be regarded as a typical component of a post-glacial European forest fauna. A number of new food-plants are added to existing lists. Those of *Lepidosaphes ulmi* are *Acer platanoides*, *Andromeda polifolia*, *Crataegus crusgalli*, *Ledum palustre* and *Ptelea trifoliata*; and of *Eulecanium corni* are *Caragana frutescens*, *Carpinus betulus*, *Crataegus crusgalli*, *Elaeagnus argentea* and *Sorbus aucuparia*.

The natural enemies found were a Coccinellid, *Chilocorus renipustulatus*, Scriba, preying on *Chionaspis salicis*; a Dipteron of the genus *Leucopis*, probably *L. annulipes*, Zett., and two Encyrtids, *Trichomasthus cyaniirons*, Dalm., and *Cerapterocerus mirabilis*, Westw., all from *Eriopeltis festucae*; and a fungus, *Isaria lecaniicola*, infesting *Eulecanium corni*.

Lists are given of all the food-plants observed and of the associations of Coccid species on a given plant.

Bovell (J. R.) & D'Albuquerque (J. P.). **Report on the Sugar-cane Experiments for the Season between 1920-22.**—*Barbados Dept. Agric.*, 67 pp., 51 tables. Barbados, 1922. [Received 20th February 1923.]

Particulars are given of the numbers of larvae and pupae of *Diaprepes abbreviatus*, L., and *Lachnosterna* (*Phytalus*) *smithi*, Arr., collected in experimental sugar-cane plots in Barbados during 1916–22. As a result of the collections the numbers are becoming less, being in 1922 one-quarter of what they were in 1916-18 and less than one-fifth of what they were in 1918–20. The monetary loss sustained from the attacks of these beetles is still considerable, and in weight amounts to about 3·35 tons of canes per acre.

Examination shows that at present mosaic disease exists practically all over the Island.

Ross (W. A.). **The Rose Chafer and its Control.**—*Canadian Hortic.*, Fruit Edn., xlvi, no. 2, p. 25, 2 figs. Peterboro, Ont., February 1923.

In certain sandy sections of Ontario the rose chafer [*Macrodactylus subspinosus*] is an extremely troublesome and destructive pest of grapes, fruit trees, flowering plants, etc. A brief account is given of its life-history and of measures against it. Grape vines, cherry trees, one-year-old strawberry plants and other plants that can safely be sprayed without danger of poisoning the fruit or spoiling the bloom should be sprayed as soon as the beetles attack them with 4 lb. lead arsenate, 1 gal. cheap molasses and 40 gals. water. In the case of the grape vines one or more extra applications may be necessary, depending on the severity of the infestation and the weather conditions.

Plotnikov (—). **О Марокксной кобылке, прусике и азиатской саранче.** [*Dociostaurus maroccanus*, Thunb., *Calliptamus italicus*, L., and *Locusta migratoria*, L.]—**Экономическое Обозрение** [Economic Review], ii, nos. 1 and 2, pp. 6–7 and 3–4. Suppmt. to **Туркправда** [Turkpravda], Tashkent, 4th and 14th January 1923.

A brief account is given of previous infestations in Turkestan by *Dociostaurus maroccanus*, Thunb., *Calliptamus italicus*, L., and *Locusta migratoria*, L., as well as of places of economic importance that are likely to be infested. One of the chief dangers is invasion from neighbouring countries, of which Persia is among the most important.

Delassus (—). **L'*Icerya purchasi* dans le département d'Oran.**—*Rev. agric. Afr. Nord*, xxi, no. 185, pp. 102–105, 4 figs. Algiers, 16th February 1923.

Icerya purchasi has been spreading to fresh localities in Algeria, as it was feared would be the case [*R.A.E.*, A, x, 331], the fresh centres of

infestation being shown on a map. By a decree issued on 18th December 1922 the prefect of Oran has ordered the application of certain measures with the object of preventing, or at least limiting, further spread. These include lopping the trees, burning infested branches and spraying with lime-sulphur. It is hoped that these measures will keep the pest in check until *Novius cardinalis* can be introduced in numbers, which will be done early in the spring.

COTTE (J.). *Polyphylla fullo*, **L., dans les vignobles du Var.**—*Bull. Soc. Path. vég. France*, ix, no. 4, pp. 260–262. Paris, October–December 1922.

Vines grown on the sandy bank of a river in Var have been destroyed by the ravages of *Polyphylla fullo*, L., the larvae of which eat through the young shoots, cutting them off completely. Vines in sandy soil in the same district near a stand of *Pinus pinaster* were also destroyed. The owner tried to protect his vines by enclosing the cuttings, before planting, in pieces of reed (*Arundo donax*) from which the middle had been hollowed out. The larvae of *P. fullo*, however, ate first the reed and then the cutting within it. The adult remains hidden in the sand during the day, and owing to its habits the insect is most difficult to deal with. The only practical remedy is injection of carbon bisulphide. Fortunately, the pest seems to be confined to sandy soils, which are not greatly used for agricultural crops, and no great number of serious infestations have been recorded.

FEYTAUD (J.). **Sur l'invasion du** *Leptinotarsa decemlineata*, **Say, dans la région bordelaise.**—*Bull. Soc. Path. vég. France*, ix, no. 4, pp. 295–303. Paris, October–December 1922.

In view of the appearance of *Leptinotarsa decemlineata*, Say (Colorado potato beetle) in the Bordeaux region, an account is given of its life-history and habits, and of the measures that have been taken against it both in France during the present outbreak and in other countries in which it has made its appearance. Much may be done by small growers to check fresh infestations by careful hand-collection each day for at least two weeks. Strict compliance with the decree of 1922 [*R.A.E.*, A, x, 536] is necessary if the spread of the pest is to be prevented.

LIENHART (R.). *Polydesmus complanatus*, **L., parasite des fraises.**—*Bull. Soc. Path. vég. France*, ix, no. 4, pp. 304–305. Paris, October–December 1922.

Blaniulus guttulatus, Bosc, is the only Diplopod hitherto recorded as a pest of strawberries, but *Polydesmus complanatus*, L., has recently been discovered causing great damage to this fruit in the Nancy district. This millipede, generally a root cutter, attacks the ripe fruit, devouring large portions of it. As many as six have been found in a single fruit, and during the last two years they have been particularly abundant, especially in the east of France. The same remedies as practised against *B. guttulatus* should be used for *P. complanatus*. Potatoes cut into slices and placed on the ground around the strawberry plants provide an excellent trap, and if these are removed and burnt each morning, and renewed each evening for several days, the numbers of *P. complanatus* should be considerably reduced.

MARIÉ (M. P.). **Influence des coupes de bois faites en 1920-1921 et 1921-1922 sur le développement des Scolytidae propres au Chêne.**—*Bull. Soc. Path. vég. France*, ix, no. 4, pp. 306–311. Paris, October–December 1922.

A survey of various forest regions in the centre and west of France has shown that many trees, particularly oaks, which keep their foliage into the autumn, suffered greatly from the drought of 1921 and exhibit a greatly lowered vitality. Under these conditions, Scolytid borers, particularly *Xyleborus monographus*, F., and *Platypus cylindrus*, F., have increased to an alarming extent, especially among those trees that have been left in reserve after thinning operations, these being particularly liable to lowered vitality owing to their sudden exposure to sun and consequent excessive evaporation. These beetles do not usually attack healthy trees, but bore into sickly trees, where their galleries are not likely to be flooded by the rising sap, and are seldom found infesting trees that have been recently exposed by thinning, as this exposure is always followed by intense circulation of sap to meet the increased evaporation.

It is suggested that when trees are growing under dry conditions, those that are meant to be kept in reserve should not be exposed by thinning operations until a certain amount of rain has enabled them to recover their vitality. This delay in exploitation of the forests would mean a temporary loss, but should be amply compensated for later on. No other practice can be suggested that offers any hope of remedy for these Scolytids, for trap trees, which are effective in the case of conifers attacked by Scolytids, are of no use in this case.

FAES (H.) & STAEHELIN (M.). **Le Phylloxéra gallicole et la désinfection des plantes de vignes.**—*Ann. agric. Suisse*, xxiii, pp. 295–303, 1 fig. Berne, 1922. [Received 26th February 1923.]

The various gall-producing forms of *Phylloxera* that attack vines, and the theories regarding the appearance of the different forms, are briefly reviewed. In Switzerland, local climatic conditions in each year evidently have a great influence on the development of the gallicolae; and their appearance or non-appearance in various regions of the country and the preference of the *Phylloxera* for certain varieties of vine [*R.A.E.*, A, x, 79, etc.] are discussed.

Observations in the laboratory and in the field on the biology of *Phylloxera* have shown that vines partly formed of American stock, of which the roots have been disinfected but not the shoots, harbour the winter eggs of *Phylloxera* on the wood, and can give rise to an infestation causing leaf-galls. Experiments made at Lausanne have confirmed the preference of gallicolae for the leaves of American vines and their aversion to native varieties. During the height of the season the gallicolae move but little from their first point of attack; later they become more dispersed. In the Valais region, the radicola forms that descend to the roots also arise in the leaf-galls together with the gallicola forms on the leaves, but the exact period of the year when these appear has not yet been determined.

Experiments to ensure the destruction of the winter egg of *Phylloxera* have been carried out, using the practice, recommended by the Federal Experiment Station at Lausanne, of immersing the stock for 12 hours in a solution of ·3 per cent. potassium sulpho-carbonate at 32° Bé., to 1 per cent. black soap. When applied to the underground part of the

plant only, this ensures complete destruction of root-infesting *Phylloxera*, including insects and eggs, without hindering the development of the vine. This process has been obligatory for years in the Canton of Vaud for all vine stocks with roots sent out from the nursery. When applied also to the parts of rooted stock above-ground this disinfection ensures the complete destruction of the winter egg, and thus prevents the appearance of the gallicola form. The growth of the plant is in no way injured by this process.

FAES (H.). **La culture du pyrèthre en Dalmatie.**—*Ann. agric. Suisse*, xxiii, pp. 305–309, 3 figs. Berne, 1922. [Received 26th February 1923.]

In view of the importance attained recently by the industry of cultivating *Chrysanthemum* (*Pyrethrum*) *cinerariaefolium*, the author has visited Dalmatia and studied the conditions under which the plant grows at its best in that country and the method of dealing with the crop. He is convinced that the cultivation of this plant as established in Switzerland compares very favourably in every way with that in Dalmatia, and that the native industry should be continued and developed.

LECAILLON (A.). **Notes sur le Négril de la Luzerne** (*Colaspidema atra*, **Latr.**). **1re Note. Ancienneté du Négril et régions diverses où on a signalé sa présence.**—*Rev. Zool. agric. & app.*, xxi, no. 11, pp. 169–174. Bordeaux, November 1922.

An account is given of the history of *Colaspidema atrum*, Latr., in France, and of the various localities from which it has been recorded, with references to the author's earlier work on the subject [*R.A.E.*, A, ii, 203; vi, 171; vii, 456, etc.].

COSTA LIMA (A. DA). & RANGEL (E.). **As pragas e molestias das plantas de cultura, no Brasil.** [Pests and Diseases of cultivated Plants in Brazil.]—*A Lavoura*, xxvi, no. 2–3, pp. 110–113. Rio de Janeiro, February–March 1922. [Received 26th February 1923.]

This list of Brazilian insect pests is a very complete one, and is arranged under the plants attacked, with particulars of the distribution, etc., of each species.

MCCARTHY (T.). **The Seed Bean Midge** (*Camptocladius macleayi*, **Skuse**).—*Agric. Gaz. N.S.W.*, xxxiii, pt. 10, pp. 733–737, 2 figs. Sydney, 1st October 1922.

The larvae of *Camptocladius macleayi*, Skuse, have caused considerable damage to early planted beans in New South Wales. They enter the seed as soon as the seed-coat bursts, eating the shoots and tearing the primary leaves. In some cases where the shoot had not been destroyed, the plants appeared above ground, although their progress had been much retarded, but the percentage of plants totally destroyed was high. The origin of the attack is unknown, but the larvae were probably already in the soil feeding on decaying vegetable matter before the beans were planted, and were afterwards attracted to the seeds as soon as germination commenced. Larvae were found free in soil where beans had been planted and not actually infested. A description is given of the larva, pupa and adult.

This infestation, so far as the author knows, is the first record of damage by Chironomid larvae, and observations suggest that it was largely influenced by too early planting in winter, when the germination of the seed and growth of the plants is slow, and the larvae are able to destroy the plant before it appears above the ground.

A dressing of lime worked into the surface of the soil before seed planting will destroy numbers of the larvae.

Froggatt (W. W.). **Insect Pests of the Cultivated Cotton Plant. No. 2.**—*Agric. Gaz. N.S.W.*, xxxiv, pt. 1, pp. 61–64. Sydney, 1st January 1923.

A brief account is given of *Anthonomus grandis* (Mexican boll-weevil) and *Platyedra* (*Gelechia*) *gossypiella* (pink bollworm), the two great cotton pests of the world. These pests might easily be accidentally introduced into Australia either in cotton seed or in unginned or badly ginned cotton, and it is only by the total prohibition of all seed from the countries where they exist and by careful examination and treatment of all seed from elsewhere that they can be kept out of the Commonwealth.

Ramsay (A. A.). **Storage Experiments with Lime intended for Sprays.**—*Agric. Gaz. N.S.W.*, xxxiii, pt. 10, pp. 747–749; & xxxiv, pt. 1, pp. 69–70. Sydney, 1st October 1922 & 1st January 1923.

Experiments to determine how lime for orchard sprays may be stored with the minimum of deterioration, and in what degree it suffers deterioration when stored by certain approved methods, are described. It is recommended that lime of good quality be used for spray preparations, and that the lime so obtained should be kept under water and used as required. Two methods of procedure are suggested: Quantities of 4 lb. should be weighed off, slaked, and covered with water in a kerosene tin, and so kept till required; or larger definite weights may be placed in a barrel and made up to a definite weight or a definite volume with water. Each aliquot then withdrawn will contain a definite quantity of lime, the amount of which can be readily calculated. Lime may be stored under water for periods of twelve months; there is a decrease in the effective lime, amounting to about $\frac{3}{4}$ per cent., but this is so slight as to be negligible.

Corbett (G. H.). **Moths from Coconut Spikes.**—*Malayan Agric. Jl.*, x, no. 7, pp. 184–185. Kuala Lumpur, July 1922. [Received 26th February 1923.]

In continuation of the notes on the "lesser" coconut spike moth [*R.A.E.*, A, xi, 117], four species of moths have been bred from coconut spikes: *Tirathaba* sp. near *trichogramma*, Meyr. (greater coconut spike moth), *Erecthias flavistriata*, Wlsm., *Pyroderces ptilodelta*, Meyr., and *Batrachedra arenosella*, Wlk. (lesser coconut spike moth). The first three were obtained from opened spikes showing considerable decay. It has yet to be decided whether the damage caused by the larvae of *B. arenosella* to the flowers of coconut before opening is so serious as that by *B. amydraula*, Meyr., on the young fruits of the date palm, but the female flowers examined showed a greater percentage of direct injury. *B. arenosella* was originally described from New Zealand, but is widely distributed in Australia, and also occurs in British Guiana and India.

SOUTH (F. W.). **Work of the Inspection Staff (April 1st–June 30th, 1922).**—*Malayan Agric. Jl.*, x, no. 7, pp. 195–199. Kuala Lumpur, July 1922. [Received 26th February 1923.]

The routine work of destroying the breeding-places of the beetles, *Oryctes rhinoceros* and *Rhynchophorus ferrugineus* var. *schach*, has been regularly sustained, and good progress has been made in the more seriously infested areas. *Plesispa reichei* was found attacking numerous young palms. Mealy-bugs did some damage to roselle in south Perak, which was also attacked by *Dysdercus* sp., but the latter was controlled by a nicotine spray. These stainers were also recorded on other species of *Hibiscus* and on cotton. Scale-insects, including *Saissetia* (*Lecanium*) *nigra*, were recorded on roselle and other species of *Hibiscus*, and Aphids caused curly leaf on roselle. A Lepidopterous larva was found in pomelos and is common in this fruit generally. *Erionota thrax* was common on banana, but did little damage.

FULMEK (L.). **Een nieuw voorschrift voor bespruiting met loodarsenaat.** [A new Instruction for spraying [Tobacco Seedlings] with Lead Arsenate.]—*Deli Proefst.*, Vlugschr. no. 21, 3 pp. Medan, January 1923.

A spray containing 1 per cent. instead of 2 per cent. lead arsenate and 0·3 per cent. soap is now used against Lepidopterous larvae injuring tobacco in seed-beds in Sumatra. The soap must be omitted if the insecticide is added to Bordeaux mixture. Applications must be made every three or four days, or immediately after the poison has been washed off by rain or watering. A fine mist-spray is required, and as the eggs are laid on the lower surface of the leaves, care must be taken to see that it is well covered.

FULMEK (L.). **Onderdompelen van bibit bij het uitplanten.** [Immersion of the [Tobacco] Seedlings when planting out.]—*Deli Proefst.*, Vlugschr. no. 22, 2 pp. Medan, January 1923.

To protect tobacco seedlings from Lepidopterous larvae the lower surface of the leaves must be well covered with lead-arsenate soap emulsion before the seedlings are planted out. This is not easy to do by spraying, but the immersion of the seedlings in the insecticide solution has proved satisfactory. The whole plant except the roots should be dipped in the solution, which should contain about 1·4 per cent. of lead arsenate, as this chemical tends to settle in the receptacle used, so that a concentration of about 1 per cent. actually occurs near the surface.

JEAN (C.). *Hypopta caestrum*, **a Macrolepidopteron injurious to Asparagus in France.**—*Le Petit Provençal*, xlviii, no. 16560, p. 5. Marseilles, 14th June 1922. (Abstract in *Internat. Rev. Sci. & Pract. Agric.*, xiii, no. 11, pp. 1414–1415. November 1922.)

The larvae of the Cossid, *Hypopta caestrum*, Hb., occasionally cause considerable damage to asparagus in the valley of the Durance, devouring the shoots and mining the roots and rhizomes. Newly-made beds, in which the roots are not well established, are chiefly attacked. The morphology and life-history of this pest are described. Burning or crushing the cocoons is an easy and effective method in small areas. The larvae may be destroyed from December to February

by dibbling in 20–30 grammes (¾–1 oz.) of carbon bisulphide per square metre (11 sq. feet), or by pouring a solution of potassium sulpho-carbonate (½–1 lb. per 20 gals.) into small shallow channels, or preferably into holes 10 inches deep, allowing four holes to 11 square feet.

Cosens (A.). **Reports on Insects of the Year. Division No. 3, Toronto District.**—*52nd Ann. Rept. Ent. Soc. Ontario, 1921,* pp.12–13. Toronto, 1922.

The insects recorded during the year included *Lachnosterna fusca* and *Lucanus dama*. Of these *L. dama* was found to be emerging from a lawn, and this may be explained by the fact that the place in question had been filled in for building purposes, and the beetles were probably emerging from trunks of trees that had been buried.

Strickland (E. H.). **Poisoned Molasses for the Destruction of Noctuid Moths.**—*52nd Ann. Rept. Ent. Soc. Ontario, 1921,* pp. 13–18, 1 fig. Toronto, 1922.

This information on the destruction of *Porosagrotis orthogonia*, Morr., has already been noticed elsewhere [*R.A.E.*, A, x, 482].

Criddle (N.). **The Western Wheat-stem Sawfly in Canada.**—*52nd Ann. Rept. Ent. Soc. Ontario, 1921,* pp. 18–22. Toronto, 1922.

The bulk of this information concerning *Cephus cinctus*, Nort., has already been noticed from another source [*R.A.E.*, A, x, 389]. In addition to the parasites recorded [*R.A.E.*, A, viii, 464] *Eupelmus allynii*, French, and a species of *Eurytoma* have also been found.

A table is given showing percentage of infestation of various grasses and of the mortality among *Cephus* larvae from parasitism and from unknown causes.

Crawford (H. G.) & Spencer (G. J.). **The European Corn Borer (*Pyrausta nubilalis*, Hübn.) : Life History in Ontario.**—*52nd Ann. Rept. Ent. Soc. Ontario, 1921,* pp. 22–26. Toronto, 1922.

This paper has already been noticed from another source [*R.A.E.*, A, x, 480].

McLaine (L. S.). **The Spread of the European Corn Borer in Southern Ontario.**—*52nd Ann. Rept. Ent. Soc. Ontario, 1921,* pp. 26–28. Toronto, 1922.

Most of this information has already been noticed [*R.A.E.*, A, x, 320].

Treherne (R. C.) & Ruhmann (M. H.). **The Imported Onion Maggot in British Columbia, with Notes on its Life History and Control under "Dry Belt" Conditions.**—*52nd Ann. Rept. Ent. Soc. Ontario, 1921,* pp. 29–33. Toronto, 1922.

A brief account is given of observations on the life-history and control of *Hylemyia antiqua*, Meig. [*R.A.E.*, A, ix, 582].

Ross (W. A.) & Robinson (W.). **Notes on the Plum Spider Mite or European Red Mite.**—*52nd Ann. Rept. Ent. Soc. Ontario, 1921,* pp. 33–42, 4 figs. Toronto, 1922.

Paratetranychus pilosus, C. & F., occurs in all fruit-growing districts in Ontario, and is particularly troublesome in the Niagara district. It was possibly introduced many years before its discovery, and has

probably been reported under the names of *Tetranychus telarius* or *Bryobia pratensis* (clover mite). In Ontario it is only of importance as a pest of European plums. Other food-plants are apple, sour cherry, Japanese plum, sweet cherry, pear and peach. The various stages are described, as well as the injury caused [*R.A.E.*, A, ix, 293]. In the early part of the season the summer eggs are laid on any part of the leaf surface and on the petioles. They hatch in from 6 to 13 days. The first generation adults begin laying about 25th May, at the time the calyces on the early varieties of plums begin to fall. In the spring the larval and nymphal stages last about 17 days, and about 7 in June and July. Each female lays from 11 to 90 eggs over a period of from 3 to 29 days. During 1921 the activities of the mite continued from the beginning of May, when the first overwintering eggs hatched, to mid October, when the last eggs were laid. There are three full generations a year, and three additional partial generations.

A table is given showing the comparative susceptibility of different varieties of plums.

The most important natural check is the depletion of the food supply. Predacious enemies are remarkably scarce. *Stethorus punctum*, Lec., only occurs in small numbers, and though *Adalia bipunctata*, L., also apparently attacks the mites, no appreciable reduction in their numbers has been observed. Special sprays are not necessary against this pest on plum trees. Lime-sulphur 1–40 applied at the times recommended for brown rot and curculio [*Conotrachelus nenuphar*], etc., when the fruit is set and most of the calyces have dropped, and again a fortnight later, has given great success. Preliminary experiments indicate that heavy applications of sulphur dust will also control the mite.

Ross (W. A.) & Caesar (L.). **Insects of the Season in Ontario.**—*52nd Ann. Rept. Ent. Soc. Ontario, 1921*, pp. 42–50, 8 figs. Toronto. 1922.

The pests of fruit recorded were :—*Cydia* (*Carpocapsa*) *pomonella* (codling moth) ; *Conotrachelus nenuphar* (plum curculio) ; *Coleophora fletcherella* (cigar case-bearer), and *C. malivorella* (pistol case-bearer), unusually abundant ; *Eucosma* (*Tmetocera*) *ocellana* (bud moth) ; *Palaeacrita vernata* and *Alsophila pometaria* (canker worms) ; *Lygus communis* (green apple bug), successfully controlled by early applications of 1 pt. nicotine sulphate to 100 gals. of the regular spray mixture ; *Tortrix* (*Cacoecia*) *argyrospila* (fruit-tree leaf-roller) ; *Paratetranychus pilosus* (plum spider mite) ; *Psylla pyricola* (pear psylla) ; *Lygus quercalbae* and *L. omnivagus* on peaches in the vicinity of oaks ; *Scolytus* (*Eccoptogaster*) *rugulosus* (fruit-tree bark-beetle), more injurious than usual, particularly to peach and cherry ; *Aphis pomi* and *A. sorbi*, causing no appreciable damage in most orchards ; *Myzus cerasi* (black cherry aphis) ; *Eriophyes pyri* (pear blister mite) ; *Bucculatrix pomifoliella*, conspicuous on apple trees ; *Empoa rosae*, of less importance on fruit trees than in the previous year owing to natural enemies ; *Empoasca mali* on apples and plums, causing a condition similar to hopperburn of potato ; *Aegeria* (*Sanninoidea*) *exitiosa*, (peach-tree borer), more injurious than usual ; *Typhlocyba comes* (grape leaf-hopper), abundant and injurious even in vineyards with comparatively clean surroundings ; *Macrodactylus subspinosus* (rose chafer) on grapes ; *Paria canella* (strawberry leaf-beetle) on strawberries and raspberries ; *Anthonomus signatus* (strawberry weevil) ; *Monophadnoides rubi*

raspberry sawfly); *Phorbia rubivora* (raspberry cane maggot); and *Metallus bethunei* (blackberry leaf-miner).

The vegetable pests were:—*Phorbia brassicae*; *Pieris rapae*; *Phytometra* (*Autographa*) *brassicae*; *Brevicoryne* (*Aphis*) *brassicae*; *Thrips tabaci* (onion thrips); *Heliothis obsoleta* (corn ear worm); *Dibrotica vittata* (striped cucumber beetle); *Euphoria inda* (brown fruit chafer), recorded apparently for the first time as injuring ears of maize, and also on peaches and pears; *Bruchus obtectus* (bean weevil); cutworms injuring asparagus; *Crioceris asparagi* (asparagus beetle), more troublesome than usual; and on potatoes *Leptinotarsa decemlineata, Epitrix cucumeris* and *Lema trilineata.*

Pests in greenhouses were:—*Neocerata* (*Dasyneura*) *rhodophaga* (rose midge), controlled by tobacco dust; *Diarthronomyia hypogaea* (chrysanthemum midge), eradicated by spraying with nicotine and soap every other day over a period of six weeks; and *Tarsonemus pallidus* (cyclamen mite).

Forest and shade trees were attacked by *Alsophila pometaria, Palaeacrita vernata, Bucculatrix canadensisella* (birch leaf skeletoniser), *Elaphidion villosum* (oak twig pruner) and *Cryptorrhynchus lapathi* (imported poplar and willow weevil).

CAESAR (L.). **The Cabbage Maggot** (*Phorbia brassicae*, **Bouché**).—*52nd Ann. Rept. Ent. Soc. Ontario, 1921,* pp. 50–52. Toronto, 1922.

A brief statement is given of the more interesting results obtained from a study of the cabbage maggot, *Phorbia brassicae,* Bch., over a period of four years, 1918–1921 [*cf. R.A.E.*, A, xi, 16].

LEOPOLD (—). **Economic Entomology in Quebec during the Past Decade.**—*52nd Ann. Rept. Ent. Soc. Ontario, 1921,* pp. 52–56. Toronto, 1922.

The history of economic entomology in Quebec during the past ten years is reviewed and an account is given of the progress made, particularly with regard to spraying and dusting, details of which have already been noticed from other sources.

ALDRICH (J. M.). **A New Tachinid Parasite of the Codling Moth (Dip.).**—*Ent. News,* xxxiv, no. 2, pp. 53–54. Philadelphia, Pa., February 1923.

Anachaetopsis vagans, sp. n., is described from Oregon as parasitising *Cydia* (*Carpocapsa*) *pomonella,* L. This Tachinid is very closely related to *A. ocypterina,* Zett., with which it is compared.

KNIGHT (H. H.). **Paradichlorobenzene as a Fumigant in the Entomological Museum.**—*Ent. News,* xxxiv, no. 2, p. 57. Philadelphia, Pa., February 1923.

Paradichlorobenzene has been successfully used against *Tribolium confusum* and Dermestid larvae infesting museum drawers. A few crystals placed in the drawer will act as a deterrent and also kill any pest present. It evaporates somewhat more rapidly than naphthaline, though half an ounce will last from five to eight weeks in a tight case, and the gas may still be effective for three or four months in cases that are kept closed.

JARDINE (J. T.). **Department of Entomology.**—*Bienn. Rept. 1920–22 Oregon Agric. Expt. Sta.*, pp. 75–79. Corvallis, Oregon, August 1922. [Received 27th February 1923.]

There is a definite seasonal succession of insect enemies of Aphids that fluctuates from year to year but is fundamentally constant. Coccinellids apparently adapt themselves for survival of the late summer dearth of Aphids by the practice of cannibalism among the larvae. Naphthaline appears to be the most promising material so far tested to prevent the entrance of the peach and prune root borer [*Aegeria opalescens*]. Slight injury resulted when the coating extended below the soil surface. Roofing-paper and naphthaline protectors appear promising for use on young trees. Tests with various sprays for apple Aphids indicate that most growers apply the delayed dormant spray too early for maximum effectiveness. The leaf-roller [*Tortrix argyrospila*] continues to be a major pest in portions of the Hood River Valley. In orchard spray tests combinations of 5 per cent. oil emulsions with lime and glue gave the best results. Picric acid was found to be the most promising substance in cylinder-oil emulsions, but its effect on the tree is not known.

The European earwig [*Forficula auricularia*] has recently become a pest of ornamental plants and gardens. A poison bran bait containing sodium fluoride has been found effective.

Additional information has been accumulated regarding the distribution of the Pacific Coast tree-crickets, their food-plants and their relations to allied species inhabiting the eastern States. Further studies are expected to throw light on the status of *Oecanthus argentinus*, which seems intermediate between the eastern *O. nigricornis* and *O. quadrimaculatus*. Spraying tests against pear-leaf blister-mite [*Eriophyes pyri*] showed that dilutions of commercial lime-sulphur greater than 1 to 12 and oil sprays are not effective against this mite. When the infestation is especially serious, an efficient spray is a combination of lime-sulphur, 1 to 12, plus oil emulsion, 2 to 100. Dry lime-sulphur 1 to 4 gave excellent results. Early application is recommended when spraying for this mite on apples.

The pear thrips [*Taeniothrips inconsequens*] appeared in 1922 in excessive numbers for the first time since 1919, but unfavourable climatic conditions have apparently prevented wholesale emergence or injury. Tent caterpillars have developed in unusual abundance during the past two seasons. In general the percentage of parasitism is from 30 to 90, the major parasite being an undetermined Tachinid. Amyl acetate has proved the most attractive bait for grasshoppers. Moisture is an important factor in rendering it attractive, and bran retains moisture better than sawdust, though the addition of equal parts of sawdust improves the physical properties of the bait for scattering. Where sodium arsenate was substituted for white arsenic, the bait was less attractive but killed nearly twice as quickly. Trials of the effectiveness of cull onions as a bait for onion maggots [*Hylemyia antiqua*] were most promising.

The results of experiments on calcium caseinate as a spreader in spray solutions and its toxic effect show that its addition to combined sprays of lead arsenate and lime-sulphur delays the reaction between the two materials, and in late cover sprays on apple it minimises the uneven colouring of the highly-coloured varieties of fruit and in general effects a more rapid covering and wetting of the sprayed surface and tends to

increase the number of trees covered per tank of spray. In toxicity tests no evidence was found to substantiate the theory that the addition of caseinate spreader adversely affects the toxicity of the arsenate spray.

DUNCAN (C. D.). **The North American Species of *Phylloxera* infesting Oak and Chestnut (Hemiptera: Phylloxeridae).**—*Canad. Ent.*, liv, no. 12, pp. 267–276, 2 plates. Orillia, Ont., December 1922.

The American species of *Phylloxera,* particularly those infesting oaks, have been very little studied in the past. The author considers that the best, if not the only reliable characters for separating the species are to be found in the apterous agamic females. A general description of this form is given.

The species dealt with are *P. stellata,* sp. n., from oak—apparently either *Quercus margaretta* or *Q. alba*—found on the lower surface of the leaves, on which it produces small, brown blotches; *P. reticulata,* sp. n., from *Q. kelloggi,* of which only apterae were found along the veins of the lower surface of the leaves of a single tree, with eggs and all stages of young; *P. davidsoni,* sp. n., from *Q. engelmanni,* on the lower surface of young foliage; *P. similans,* sp. n., from an oak, probably *Q. macrocarpa,* closely allied to the preceding species; *P. tuberculifera,* sp. n., apparently from *Q. havardi,* causing brownish spots on the lower surface of the leaves; *P. querceti,* Perg., of which the apterous female is described from *Q. alba, Q. macrocarpa, Q. panonia* and *Q. daimio*; *P. rileyi,* Riley (recorded by Riley from various oaks, and by Pergande from *Q. alba* and *Q. obtusiloba*), of which the distinguishing features are noted; and *P. castaneae,* Hald., from *Castanea* spp., two forms of the apterous female being described—one with long tubercles and one with short; these may be specifically distinct.

BAERG (W. J.). **The Strawberry Tiger Moth, *Haploa reversa,* Stretch.**—*Arkansas Agric. Expt. Sta.*, Bull. 183, 14 pp., 5 plates, 4 figs. Fayetteville, Ark., January 1923.

Caterpillars that were found in numbers on strawberry foliage in Arkansas in the spring of 1920 were reared to the adult stage and proved to be *Haploa reversa,* Stretch (strawberry tiger moth). As the attack is confined to the foliage while it is developing, the injury is not really serious and the crop remains unaffected, though in any year the caterpillars might become sufficiently numerous to reduce the yield. The larvae are most commonly found on apple trees, where they feed on the buds as soon as these begin to separate, remaining on the trees for several weeks. In unsprayed orchards the caterpillars, when numerous, consume many of the fruit buds and thus materially lessen the crop; in well-sprayed orchards they have not been recorded.

In the insectary eggs were first observed on 2nd June, and were laid in masses on the leaves. They hatched on 11th and 12th June, and the young larvae began to feed on the lower surface of the leaves. Attempts to rear them to maturity in the insectary failed. Apparently apple foliage (on which they were fed) is not the normal food for the young larvae, which have never been observed in the orchard, and it is not known on what they feed during the summer and autumn. Apple and strawberry foliage is attacked simultaneously, and after feeding on these plants for a month or more the larvae spin flimsy cocoons among dry leaves and pupate, the pupal stage in the insectary lasting

from three to four weeks. The adult moths occur in two forms, banded and white.

The caterpillars appear in the spring just about the time when remedies are being applied for weevils, and dust mixtures containing arsenic in some form should be sufficient to control them. In apple orchards it might be necessary to add some lead arsenate to the regular dormant spray mixture, and if the caterpillars are very numerous, the position might be repeated in about 10 days. This would merely mean adding some arsenical to the dilute lime-sulphur spray applied for scab.

Previous records of the species are reviewed, and its specific characters are discussed.

WATSON (J. R.). **The Flower Thrips.**—*Florida Agric. Expt. Sta.*, Bull. 162, pp. 27-51, 4 figs. Gainesville, Fla., June 1922. [Received 27th February 1923.]

Frankliniella bispinosa, Morgan, is common in all but the extreme southern part of Florida, where it is largely replaced by the closely related *F. cephalica* var. *masoni*, Watson.

Most plants of the rose family are attacked. Infestation is generally confined to the tenderest parts of the blossoms, though in the absence of other food opening buds and leaves such as those of the pear and peach may be attacked. In citrus blooms the thrips feed chiefly on the thick fleshy petals and stamens. The eggs are laid in the expanded tip of the stem, which bears the fruit (the receptacle), and the winged adults leave the tree shortly after the petals have fallen. The eggs hatch in three or four days, and the wingless young feed on the receptacle and on the young fruit. On reaching maturity they acquire wings and fly off to more succulent food. The feeding of the insects may cause the fruit to drop and the numerous shallow punctures on the surface give rise to characteristic markings, which lower the grade of the fruit.

According to Quaintance, the total life-cycle occupies 12 days, with 3 for the egg, 5 for the larva and 4 for the pupa. This was found to be somewhat below the average of the results obtained under laboratory conditions in April or May. Although a number completed development in 10 days, the average proved to be 15, one case of 24 being recorded. Apparently about 20 days are required to produce a generation, there probably being about 12 a year. The winter is passed in Florida in the adult stage in the flowers, breeding probably occurring on warmer days. The adults are capable of living at least eight weeks in the winter. Heavy rains reduce their numbers, as also does the predacious bug, *Triphleps insidiosus*.

The results of six years' spraying experiments show that one opportune spraying generally reduces the amount of seriously marked fruit by 50 per cent., the chief obstacle to spraying being the irregularity of the blooming period. Late blossoms are infested by thrips that escape the spray or come into the grove afterwards. To prevent reinfestation weeds should be destroyed, one of the commonest being *Bidens leucantha*. The weeds on the margins of the grove must also be cut ; this should be done in January, so that most of the thrips will die before the citrus trees begin to bloom. Spraying is profitable in groves with an average of 25 thrips to the blossom, the best insecticide being tobacco extract. Better results are obtained by the addition of a spreader consisting of 1 or 2 lb. of soap to 50 U.S. gals. or lime-sulphur 1 to 70.

Lime-sulphur alone is not satisfactory under Florida conditions. Oil emulsions are not safe to use on blossoms and young fruit. The best

...e for the application is a day or two after the maximum bloom ...her than before. Two sprayings gave better results than one, though ...s doubtful whether the second is worth while, except in special cases ...ch as when the infestation is unusually heavy or in the case of a ...mbination spray against some other pest as well. The best killing ...sults are obtained with one full U.S. pint (13 oz.) of nicotine sulphate ...ack-leaf 40) to 100 U.S. gals. of lime-sulphur in the proportion of ...:70. Instructions are also given for the preparation of tobacco extract ...om refuse tobacco. Pomelos generally require a lime-sulphur spray ...ainst scab, to which the tobacco may be added at the rate of 9 or 10 oz. to 100 U.S. gals. of lime-sulphur. Experiments were made with ...me and nicotine sulphate dusts containing 2·2, 5 and 10 per cent. of ...icotine sulphate. The weakest mixture gave as good results as the ...ronger ones, and provided it is applied with sufficient force to pene...rate behind the column of stamens, as many thrips are killed as by ...praying; but in cases where the blossoms were only exposed to a drifting ...ust cloud only about 50 to 60 per cent. were killed as compared with ...5 to 90 per cent. with spraying. Further experiments are required ...efore the practicability of the dusting method can be recommended. ...spray schedule for citrus is given. On tomatos and strawberries the ...hrips may be controlled by similar measures as are recommended for ...itrus.

If sufficiently abundant, *F. bispinosa* may cause the deformation or ...en destruction of the leaves and fruit of deciduous fruit trees, the ...neral character of the injury resembling that of *Taeniothrips incon-...quens* (*Euthrips pyri*) in other States. Other food-plants are dew-...rries, blackberries, mulberries, groundnuts and roses. On the last ...med the thrips may be destroyed by tobacco extract or a strong ...lution of soap as a spray. An alternative method is to pick the entire ...er crop, taking care not to disturb the thrips, but to destroy them by ...opping the blossoms into kerosene water solution.

Other flower-frequenting thrips mentioned are *F. insularis* (Cuban ...ower thrips), probably introduced from Cuba; *F. fusca* (tobacco ...rips), which is chiefly a pest of tobacco, but also occurs on other plants, ...cluding strawberries, oats, turnips, dewberries, mustard and plantain, ...d may be controlled by the methods given above; *Thrips abdominalis* (composite thrips), which occurs on plants of the sunflower family, and ...ough not of great economic importance, may be confused with *F. ...spinosa*; *T. tabaci* (onion thrips); *Leptothrips mali* (black garden ...thrips); *Thrips spinosus* (magnolia thrips); and *Heterothrips aesculi* (buckeye thrips), which is of no economic importance, but should not be ...nfused with *F. bispinosa*.

WATSON (J. R.). **Bunch Velvet Beans to Control Root-knot.**—*Florida Agric. Expt. Sta.*, Bull. 163, pp. 55–59, 2 figs. Gainesville, Fla., June 1922. [Received 27th February 1923.]

Although the results previously recorded [*R.A.E.*, A, x, 361] were quite satisfactory from the point of view of controlling the Nematode [*Heterodera radicicola*, Greef], the summer fallow is objected to on the ground that it greatly impoverishes the soil. As a result of subsequent experiments, bunch velvet beans are recommended for planting on infested land. They should be planted as early as possible after the last spring crop has been removed, in June or even May. For the success of this method it is essential that constant cultivation is main-tained and that all weeds are kept out of the field. Runner beans are less satisfactory, as their growing season is longer, and because the

clearance of weeds is almost impossible owing to the method of growth. The experience of the last two years indicates that one summer is sufficient to reduce the Nematodes to a point where a crop of susceptible plants can be grown on the land, but cultivation must be frequent—at least once a week, particularly after rain. The beans should be planted in rows, not more than 3½ feet apart and not less than 18 inches apart in the row. To insure a good stand they should be sown considerably thicker than this. Maize may be planted between the rows, as, though not absolutely immune to root-knot, it is sufficiently resistant not to interfere much with the destruction of the Nematodes.

As velvet beans are the favourite food-plant of the velvet-bean caterpillar [*Anticarsia gemmatalis*, Hb.], they should be protected against this pest by dusting with a mixture of equal parts of lead arsenate and air-slaked lime ; Paris green or calcium arsenate cannot be used.

BEYER (A. H.). **The Bean Leaf-hopper and Hopperburn, with Methods of Control.**—*Florida Agric. Expt. Sta.*, Bull. 164, pp. 62–88, 16 figs. Gainesville, Fla., June 1922. [Received 27th February 1923.]

This information concerning the life-history, habits and control of *Empoasca mali* (bean leaf-hopper) has already been noticed elsewhere [*R.A.E.*, A, x, 532].

WATSON (J. R.). **Report of the Entomologist.**—*Florida Agric. Expt. Sta. Rept. 1920–21*, pp. 29–33 R. [Gainesville, Fla.] [Received 27th February 1923.]

The best results in experiments for the eradication of root-knot were obtained with a combination of sodium cyanide, using at least 1,200 lb. per acre, and ammonium sulphate, 1,800 lb. Two-thirds of these amounts proved nearly as effective. Trials are being made to test the relative efficiency of this treatment when applied at different times in the year. Ammonium sulphate alone considerably reduced the number of Nematodes [*Heterodera radicicola*] ; sodium cyanide alone was rather less effective, but neither alone was as successful as the combination. Incidentally, it was found that 600 lb. cyanide and 900 lb. sulphate killed all animals in the soil, among which were *Lachnosterna* sp. (white grubs), crickets, mole-crickets, earwigs, ants, termites, wireworms and grasshoppers. The use of velvet beans for the purpose of Nematode control is discussed elsewhere [*R.A.E.*, A, xi, 197].

Anticarsia gemmatalis, Hb. (velvet-bean caterpillar) has been gradually increasing since 1917, its numbers apparently being correlated with the nature of the winter weather. After a mild winter the caterpillars appear earlier and very abundantly ; severe frosts reduce their numbers greatly, and the length of time between the first and last severe frosts seems to be of paramount importance. The insects do not hibernate, and are starved if there is a long period during which their food-plants, which are all very sensitive to frost, are lacking. It therefore seems possible now to predict at the time of planting the probable abundance of the insect for the coming season. There are many predators, and about 1 per cent. of the pupae are parasitised, but the most effective enemy is a fungous disease [*R.A.E.*, A, v, 114]. Several species of Hesperids and Jassids seem to be gradually adapting themselves to the velvet bean and are becoming more abundant each year.

Thrips were abundant in *Citrus* blooms following a dry spring, and the best remedy found for them was Black-leaf 40, 1 : 800, with lime-sulphur solution (1 : 70) or with soap (4 or 5 lb. to 50 U.S. gals.). Lime-sulphur alone is not satisfactory. The camphor thrips [*Cryptothrips floridensis*] has been studied, but is lately receiving less attention, as the successful manufacture of synthetic camphor seems likely to eliminate the commercial growing of trees for distilling purposes. The bean thrips [*Heliothrips fasciatus*], only observed once previously in Florida, has been discovered abundantly infesting kudzu bean [*Pueraria hirsuta*], which is a new food-plant ; it was formerly found on wild *Cassia*, and is probably a native species that only occasionally becomes numerous enough to cause material damage.

The three chief plant bugs are *Nezara viridula*, L., *Leptoglossus phyllopus*, L., and *Acanthocephala femorata*, F. The first is injurious in tobacco fields near gardens where some of the favourite winter and early spring food-plants, such as turnips, mustard, potatoes and snap beans are allowed to stand after harvest. About 10 per cent. of the adult bugs were parasitised by a Tachinid fly, *Trichopoda pennipes*, Wd. Thistles are the most important wild winter food-plant of all these bugs, and should be eradicated wherever possible. *L. phyllopus* is found abundantly on *Baccharis* in November. Sunflowers are a very satisfactory summer trap crop for these bugs, and are attractive to all three species, though at different stages. *A. femorata* attacks the young stalks ; *N. viridula* attacks the leaves, and *L. phyllopus* is attracted to the juices of the developing seed. The Jassid, *Empoasca mali*, Le B., causes much damage to early autumn beans, and is being investigated. The Coccinellid, *Delphastus catalinae*, Horn, continues to keep down the whitefly [*Dialeurodes citri*], against which it was introduced, but should be regarded only as an accessory remedy, and spraying should be continued.

Uphof (J. C. T.). **Ueber die Verwendung von Krankheitserregern zur Bekämpfung schädlicher tropischer Insekten.** [On the Use of Disease-causing Agents in combating injurious Tropical Insects.]—*Tropenpflanzer*, xxvi, no. 1, pp. 4–7, 1 fig. Berlin, January–February 1923.

This article gives a resumé of the use of fungi to destroy insect pests of *Citrus* and other plants in Florida, many particulars of which have been given from other sources.

Schulze (P.). **Biologie der Tiere Deutschlands.**—Cr. 8vo., in progress, Berlin, Verlag Gebrüder Borntraeger, 1923. Price not stated.

The aim of this work is to present the biological data of more general importance of the Animalia (from Protozoa to Vertebrata) of Germany in particular and of Central Europe in general. The parts dealing with the groups coming within the scope of this *Review* will be noticed separately, under their respective authors, as they apear.

Priesner (H.). **Thysanoptera (Physopoda, Blasenfüsse).** Teil 29, pp. 1–10, 7 figs.

Hering (M.). **Durch Insektenlarven erzegte Blattminen.** [Leaf Mines produced by Insect Larvae.]—*Biol. Tiere Deutschlands*, Teil 43, pp. 1–17, 18 figs. Berlin, 1st February 1923.

Each of these two contributions to the treatise, the general scope of which is indicated in the foregoing notice, has a short bibliography appended.

Departmental Activities: Entomology.—*Jl. Dept. Agric. Union S. Africa*, vi, no. 2, pp. 112–114. Pretoria, February 1923.

Lema bilineata, Germ. (tobacco slug) has recently been recorded from a new locality in the Transvaal, where it has probably occurred for several years but has passed unnoticed owing to the small amount of tobacco grown there. It can be controlled by sprays of 4 oz. lead arsenate paste or 2 oz. powder to 4 gals. of water. *Laphygma exigua* (lesser mystery worm) has been troublesome, but is fairly heavily parasitised, and is not likely to cause such severe losses as *L. exempla* (true mystery worm), of which there was a serious outbreak in 1919–20. Swarming butterflies, of which the chief is the Pierine, *Belenois mesentina*, appear nearly every spring, flying northward as soon as the adults have emerged, but where they settle for oviposition is not known. *Brachytrypes membranaceus* (giant cricket) is reported as injurious from time to time, generally in sandy soil. Studies on flies infesting wild olives showed that *Dacus* (*Chaetodacus*) *biguttulus* can live for two months in captivity and *Munromyia nudiseta* for four and a half months. Among plant bugs, *Lygaeus militaris* causes considerable damage by sucking the juices of apricots and other fruits on the trees. Sprays are not of much use owing to the activity of the insects; the only satisfactory method is hand collection into a tin of water containing a little paraffin oil. Maize weevils (*Protostrophus* spp.) have been much less injurious owing to a better season for the growth of the plant.

GHESQUIÈRE (J.). **La teigne de la pomme de terre au Congo belge**—*Ann. Gembloux*, xxix, no. 2, pp. 38–43, 4 figs. Brussels, February 1923.

An account is given of *Phthorimaea operculella*, Zell. (potato tuber moth) as occurring in the Belgian Congo. In 1919, in Katanga, as much as 90 per cent. of the crop in some fields was ruined, and considerable losses are still experienced in some localities. A Braconid parasite of the larvae and pupae has been discovered, and requires further investigation. The mite, *Pediculoides ventricosus*, has been found in numbers on a few larvae, and spreads rapidly among larvae in breeding boxes. The damage done by the insect and the usual remedial measures are described. Certain legislation has been passed for the purpose of preventing further introductions of the moth [*R.A.E.*, A, x, 277], but the author is of opinion that the principal remedial measures ought to be rendered compulsory.

ZILLIG (H.). **Der Heu- und Sauerwurm und seine Bekämpfung.** [The First and Second Generations of the Vine Moths.]—*Wein u. Rebe*, iii, no. 11. Mainz, 1922. (Abstract in *Zeitschr. Pflanzenkrankh. u. Gallenk*,. xxxii, no. 7–8, p. 334. Stuttgart, 1922.) [Received 27th February 1923.]

In the Rhine and Moselle districts in 1921 there was a very severe outbreak of the first generation of the vine-moths, *Clysia* (*Conchylis*) *ambiguella*, Hb., and *Polychrosis botrana*, Schiff. In the areas where *C. ambiguella* occurred the second generation was almost absent, whereas in the case of *P. botrana* it was exceedingly severe. The difference is due to the abnormal drought and heat in July, which destroyed *C. ambiguella*, but scarcely affected *P. botrana*. The importance of ascertaining in given cases the numerical proportion between the two species is evident. Observation of the date of flight is, of course, necessary for spraying, nicotine being the best insecticide for the purpose, though arsenicals are much cheaper.

KNECHTEL (W. K.). *Phytodecta fornicata*, **Brüggm.**—Reprint from *Buletinul agriculturii*, 32 pp., 16 figs. Bucarest, 1922. (With a Summary in French.) (Abstract in *Zeitschr. Pflanzenkrankh. u. Gallenk.*, xxxii, no. 7-8, p. 338. Stuttgart, 1922.) [Received 27th February 1923.]

Since 1910 *Phytodecta fornicata*, Brüggm., has been noticed as a pest of lucerne in Rumania. The beetle appears at the end of April or earlier. The females usually deposit batches of 3–14 eggs, and these hatch in six days. The larvae become full-grown in 16 days and pupate in the ground, the adults emerging 25 days later. There is only one generation a year. The measures advised are repeated cutting of the lucerne before the larvae appear, and harrowing in spring and autumn.

BAUDYŠ (E.). **Drátovci a ochrana proti nim.** [Wireworms and Protection against them.]—*Flugbl. tschech. Sektion mähr. Landeskulturrates in Brünn*, 2 pp., 1922. (Abstract in *Zeitschr. Pflanzenkrankh. u. Gallenk.*, xxxii, no. 7-8, pp. 341-342. Stuttgart, 1922.) [Received 27th February 1923.]

The larvae of *Agriotes* are most dangerous enemies of young cereals and beets in Czecho-Slovakia. If the beet-field is flooded, these wireworms go deeper into the soil and resist starvation for a long period, but suffer considerably from parasitic fungi. No remedies are known for large areas. Infested ground should be sown with peas or other quick-ripening crops. After these are harvested, the ground must be deeply harrowed or ploughed in warm weather in order that the larvae thus turned up may be destroyed by sunshine, birds, etc.

PEIRSON (H. B.). **Mound-building Ants in Forest Plantations.**—*Jl. Forestry*, xx, no. 4, pp. 325–336, 1922. (Abstract in *Expt. Sta. Record*, xlvii, no. 8, pp. 761-762. Washington, D.C., December 1922.)

This is a report of observations begun in 1919 in the Harvard forest at Petersham, Mass., of the loss caused by *Formica exsectoides*.

Where the mounds occur the trees soon begin to die in an ever-widening circle around the nests, the areas of dying trees being found only around the ant mounds. Close inspection shows a deep constriction or lesion on the main stem near the base of the trees, appearing as though rodents had been feeding upon the trunks, except that the bark is in most cases intact. The constriction extends from about 3 in. above the ground to a distance of about 4 in., entirely encircling the stem. Observations indicate that the ants kill the trees in an effort to keep their nests continually in the sunlight. White pine over 6 ft. in height is rarely killed. There seems to be no limit to the species of trees killed or severely injured, the author having observed attacks on a variety of trees, both coniferous and deciduous. The life-history and habits of the ant, the manner in which the trees are killed, and remedial measures, are discussed.

BODENHEIMER (F.). **Beiträge zur Kenntnis von** ***Tipula oleracea*****, L. Zur Schädlingsökologie.** [Contributions to a Knowledge of *T. oleracea* and to the Ecology of Pests.]—*Zeitschr. angew. Ent.*, ix, no. 1, pp. 1–80, 12 figs. Berlin, January 1923.

The first section of this paper, which includes many references to published information, deals with the life-cycle of *Tipula oleracea*, L.

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(of which *T. paludosa*, Mg., is considered a synonym), with its food in the larval stage, and with its behaviour towards climatic factors. The author's observations of the life-cycle agree with those of Rennie [*R.A.E.*, A, v, 361]. In Germany the eggs are usually found in August and September, the larvae from October to the following July, the pupae in June and July, and the adults from July to September. The rare occurrence of adults from April to July is quite unimportant as regards the life-cycle. *T. oleracea* thus has one generation a year north of the Alps. The marked cannibalism of the larvae is of practical importance; experimentally 250 larvae were reduced to 35 in three weeks. It depends on the presence of moisture, for larvae kept in dry cartons died in 60–80 hours without attacking each other. The amount of food consumed daily by the larva amounts roughly to 5–10 times its weight. The larvae are very sensitive to drought, which causes most of the deaths of the young individuals. Wet weather at the end of summer and in autumn provides the best conditions for an outbreak in the following year. Cold must be severe and prolonged if it is to kill the larvae, and statements that a hard winter destroys them must be accepted with reserve. The migration of the larvae is an established fact, but cannibalism may account for some part of the disappearances observed. Dampness and looseness of the soil favour oviposition. Natural enemies include moles, birds, spiders, a Tachinid parasite, *Bucentes geniculata*, and bacterial infections. Injury by *T. oleracea* is temporary, usually lasting one year, rarely two or three.

Crops of clover, lucerne, etc., should be avoided in threatened areas, though on moorland newly brought under cultivation, where outbreaks are inevitable, clover may be grown in view of its soil-enriching qualities. In Germany quickly-developing crops should be grown in infested localities, and if necessary two or three times the normal quantity of seed may be sown to ensure a crop. A bibliography of 259 works is given.

Bogdanov-Katkov (C.). **Die Wanderheuschrecke im Kuban-Gebiet (Kaukasus) in den Jahren 1920-1921.** [The Migratory Locust in the Kuban Region (Caucasus) in 1920–1921.]—*Zeitschr. angew. Ent.*, ix, no. 1, pp. 105–110. Berlin, January 1923.

The appearance of *Locusta migratoria*, L., in the Kuban region in 1920 was quite unexpected, for in the previous year this locust had been reported in limited numbers only. Warnings were sent too late, the last larval stage having been reached, and owing to lack of insecticides and sprayers only trap-trenches were used, and these proved quite inadequate. Owing to the excess of food provided by reeds in the lowlands cultivated areas were not infested, but by November about 93,000 acres of reeds had been consumed.

Steps were taken, however, to protect the corn in certain districts in 1921. On 18th May the first hatchings were notified, and in 67 days over 6,200 workers dug about 78 miles of trenches and 10,000 pits, and used 41 rollers. It is estimated that 10,500 tons of locusts were destroyed, accounting for the bulk of them and preventing a complete loss of crops. On 15th July the locusts had become winged, and the work was stopped, only scouting being continued.

Experiments are being conducted with poisonous gases.

MEYER (R.). **Die parasitischen Hymenopteren der Fritfliege** (*Oscinosoma frit*, **L.**). [The Hymenopterous Parasites of the Frit Fly, *Oscinella frit*.]—*Zeitschr. angew. Ent.*, ix, no. 1, pp. 111–120. Berlin, January 1923.

The very dry spring of 1921 resulted in an enormous increase of all corn pests, including *Oscinella* (*Oscinosoma*) *frit*, L. Their parasites abounded as a natural consequence, and the author was able to breed a number of Hymenoptera from pupae of the frit-fly.

The literature on the parasites of the frit-fly is briefly reviewed [*cf. R.A.E.*, A, vii, 70]. The author gives a list of the following species now known to him :—CYNIPIDAE : *Cothonaspis fuscipes*, Hedicke (a new species described here) ; *Eucoela eucera*, Htg. ; *E. eucera tristis*, Htg. ; and *E. widhalmi*, Kurd. PROCTOTRUPIDAE : *Loxotropa tritoma*, Thoms. CHALCIDIDAE : *Semiotellus nigripes*, Lind. ; *Halticoptera petiolata*, Thoms. ; *Habrocytus* sp. ; *Trichomalus cristatus*, Först. ; *T. frontalis*, Thoms. ; *Pteromalus puparum*, L., and *P. micans*, Ol. (both included by Rörig and by Collin as parasites of the frit-fly, though their status is considered uncertain) ; *Merisus intermedius*, Lind. ; *Polycystus oscinidis*, Kurd. ; and *Neochrysocharis immaculatus*, Kurd. BRACONIDAE : *Sigalphus caudatus*, Nees ; and *Hyrocampa pospelovi*, Kurd.

The original descriptions are given of the foregoing species, which may be regarded as primary parasites of *O. frit*.

DINGLER (M.). **Die Schlupfwespe** *Ephialtes manifestator*, **L., bei der Vorbereitung zur Eiablage.** [The Ichneumonid, *E. manifestator*, during Preparation for Oviposition.]—*Zeitschr. angew. Ent.*, ix, no. 1, pp. 153–154, 5 figs. Berlin, January 1923.

The methods adopted by *Ephialtes manifestator*, L., a parasite of wood borers, when searching for a place in which to bore for oviposition, are described, the insect apparently being guided by scent. The antennae are stroking the wood all the time the ovipositor is boring, and the fact that the latter is sometimes withdrawn from a depth and a new attempt made elsewhere would seem to show that a movement of the intended host larva in the wood has been detected by smell.

KLEINE (R.). **Nachtrag zur Gesamtliteratur der Borkenkäfer.** [Supplement to the Complete Literature of the Bark-beetles.]—*Zeitschr. angew. Ent.*, ix, no. 1, pp. 165–180. Berlin, January 1923.

This bibliography supplements that by Tredl and Kleine of the literature from 1758 to 1910, issued in 1911. The references include those in a short list already published [*R.A.E.*, A, viii, 175]. An appeal is made for separates of papers on the subject to help the issue of further lists.

The Sale of Diseased Plants Order of 1922.—*Statutory Rules and Orders*, 1922, no. 582. H.M. Stationery Office, London, 31st May 1922.

This Order came into operation on the 1st July 1922 and revokes the Order of 1921 [*R.A.E.*, A, ix, 485]. No change is made in the insect pests against which the legislation is directed, but the conditions are given under which inspectors can order the destruction or disinfection of plants attacked by pests mentioned in the schedule to this Order

HOARE (A. H.). **The Rhododendron Bug,** *Stephanitis* (*Leptobyrsa*) *rhododendri*, **Horvath, and a Report upon Experiments with various Insecticides.**—*Jl. R. Hortic. Soc.*, xlviii, pt. 1, pp. 16–21. London, January 1923.

The damage caused by *Stephanitis rhododendri*, Horv., has been so severe in some districts, that the abandonment of rhododendron cultivation has had to be considered. This Tingid is included in the schedules of the Sale of Diseased Plants Orders, and a general description of it and notes on its life-history have already been noticed [*R.A.E.*, A, x, 554]. Experiments with various insecticides are described. A wash with a good standard potash soap alone is thoroughly effective, the addition of nicotine giving no better results. No apparent advantage is gained by employing whale-oil soap instead of ordinary soft-soap. Paraffin emulsion did not give as good all-round results, although it was effective. If the infestation is heavy, two sprayings are necessary; the first should be applied about the third or fourth week in June and the second a fortnight later.

RAMSAY (A. A.). **Two Investigations in relation to Sprays.**—*Agric. Gaz. N.S.W.*, xxxiii, pt. 7, pp. 513–514. Sydney, 1st July 1922.

A description is given of experiments in the preparation of home-made tobacco wash. Two formulae are compared, one consisting of 10 lb. waste tobacco, 5 oz. washing soda and 30 gals. water, and the other of tobacco waste and water only. The conclusion is drawn that there appears to be little advantage in using washing soda in the preparation of home-made tobacco infusions. The aim of the second experiment was to ascertain if any harmful compounds were formed in a mixture of Bordeaux mixture, lead arsenate and tobacco. There is nothing to indicate that harmful results would accrue from such a mixture, but preference should be given to a tobacco infusion made without the addition of soda when compounding such a triple spray.

MERCET (R. G.). **Una subfamilia nueva de Himenópteros Calcidoideos.**—*Bol. R. Soc. Espan. Hist. Nat.*, xxii, no. 8, pp. 363–370, 4 figs. Madrid, October 1922.

A new subfamily ANTHEMINAE is created for the Mimarid, *Anthemus chionaspidis*, How., and other members of this genus, the species of which are parasites of Coccids. *Anthemus leucaspidis*, sp. n., a parasite of *Leucaspis pini* on *Pinus halepensis* and *P. sylvestris* in Madrid, is described.

A key is given to the species of the genus *Anthemus*.

MERCET (R. G.). **Calcidoideos nuevos de Francia.**—*Bol. R. Soc. Espan. Hist. Nat.*, xxii, no. 9, pp. 396–402, 4 figs. Madrid, November 1922.

The new species described from Mentone are *Tetrastichodes platanellus*, a parasite of *Phyllorycter* (*Lithocolletis*) *platani*, and the Encyrtid, *Coccidencyrtus poutiersi*, a parasite of the Coccid, *Howardia zamiae*, on *Cycas revoluta*.

MERCET (R. G.). **Adiciones a la fauna española de Encírtidos, 1ª & 2ª Notas.**—*Bol. R. Soc. Espan. Hist. Nat.*, xxii, no. 10, pp. 474–481; xxiii, no. 1, pp. 49–56, 4 figs. Madrid, January 1923.

Under the above title the author proposes to publish a series of notes additional to his book *Fauna Iberica: Familia Encirtidos* [*R.A.E.*, A, x, 252].

Some further new species are described and certain corrections made in the nomenclature.

DE MORA (R. F.). **Sobre la presencia de la hormiga argentina** (*Iridomyrmex humilis*, **Mayr**) **en Valencia.**—*Bol. R. Soc. Espan. Hist. Nat.*, xxiii, no. 2, pp. 77–78. Madrid, 23rd February 1923.

The Argentine ant (*Iridomyrmex humilis*, Mayr) has been discovered in considerable numbers in the orange orchards of Valencia, where it protects the Coccids, *Pseudococcus* (*Dactylopius*) *citri*, *Coccus* (*Lecanium*) *hesperidum*, *Saissetia oleae*, *Icerya purchasi*, and probably others. No direct damage to the trees has as yet been observed owing to the presence of the ant, while in some cases it has obviously caused the disappearance of the smaller ant, *Pheidole pallidula*, which is abundant in the region.

Alcohol and benzine sprayed on to the colonies has given good results against *I. humilis*; arsenicals have not yet been tried, but these will be tested, and also solutions of lysol and lime polysulphides. Sticky substances painted round the trees to prevent the access of the ant have been made of 20 lb. resin to 1½ gals. of castor-oil, or 5 lb. of some greasy substances with 1 gal. fish-oil and 10 lb. powdered resin. The drawback to these is that they dry rapidly and are then easily traversed by the ants.

ESSIG (E. O.). **Insect Notes from Laguna Beach, California.**—*Jl. Ent. & Zool.*, xiv, no. 4, pp. 75–78. Claremont, Cal., December 1922.

The insects collected include *Trichothrips ilex*, Moulton, occurring in all stages on *Malvastrum fasciculatum* and also attacking *Heteromeles arbutifolia*; *Saissetia oleae*, Bern., widely distributed on many native plants including California sage (*Artemisia californica*), willows (*Salix*) and *Rhus integrifolia*; *Murgantia nigricans*, Ckll., the local black variety of *M. histrionica*, Hahn (cabbage bug), which occurs abundantly on wild mustard and wild bladder-pod (*Isomeris arborea*), overwintering and surviving on the latter when the mustard fails in dry years, the eggs being parasitised by the Encyrtid, *Ooencyrtus johnsoni*, How.; *Leucopis griseola*, Fall., reared from leaves of musk-melon vines infested with *Aphis gossypii*, Glov.; and *Aegeria mellinipennis*, Bdv., occurring on Western sycamore (*Platanus racemosa*), which is apparently its native food-plant.

MIKHELSON (I. Ya.). **Наблюденія надъ перелетной саранчей.** [**Observations on the Migratory Locust.**]—**Извѣстія Московскаго Энтомологическаго Общества** [*Bull. Moscow Ent. Soc.*], ii, no. 1, pp. 7–67, 7 figs. Moscow, 1922.

A detailed account is given of the biology of migratory locusts as observed in the summer of 1913 in the Caucasus by E. V. Yatzenkovski and during the summer of 1914 in the Ural district under the direction of N. G. Rozanov.

WILSON (C. E.). **Report of the Entomologist.**—*Rept. Virgin Islands Agric. Expt. Sta. St. Croix. 1921*, pp. 12–24. Washington, D.C., October 1922. [Received 2nd March 1923.]

A full list of the vegetable, fruit and field crop pests found in the Virgin Islands with their food-plants is given.

Margarodes formicarum is the only scale-insect to be added to the list given in the previous year's report [*R.A.E.*, A, ix, 429], and was present in great numbers in sugar-cane stools. A list is given of the scale-insects attacking ornamental plants. *Cryptotermes* sp. was a serious pest of timber, and a Bostrychid beetle, *Schistoceros cornutus*, was destructive to fence posts and stakes. A general account is given of direct and indirect remedial measures for insect pests.

ANDERSON (T. J.). **Green Scale**—*Coccus africanus*, **Newst.**—*Farmers' Jl.*, v, no. 4, pp. 8 & 29. Nairobi, 25th January 1923.

In view of the outbreak of *Coccus africanus*, Newst. (green scale) in some of the coffee-growing districts of East Africa, some notes are given on the allied species *Coccus* (*Lecanium*) *viridis*, Green.

KITAJIMA (—) & METALNIKOV (—). **Une Maladie mortelle chez les Chenilles de** *Galleria mellonella*.—*C.R. Soc. Biol.*, lxxxviii, no. 7, pp. 476–477. Paris, 1923.

A second epidemic of a fatal disease [*R.A.E.*, A, x, 519] has occurred among the larvae of *Galleria mellonella* in the laboratory. Two organisms have been isolated, *Bacterium galleriae* and a *Micrococcus*, and in experiments each of them caused the death of the larvae.

COTTE (J.) & REYNIER (A.). **La dioecie du Figuier et** *Blastophaga psenes* **(L.)**.—*C.R. Soc. Biol.*, lxxxviii, no. 7, pp. 500–502. Paris, 1923.

The authors discuss the evolution of the fertilisation of figs and its connection with *Blastophaga psenes*.

BURNETT (W. L.). **A Study of the Food Habits of the Ring-necked Pheasant in Colorado.**

MAXSON (A. C.). **Feeding Habits and Food of the Ring-necked Pheasant.**—*Office State Ent. Colorado*, Circ., 31, 31 pp. Fort Collins, Col., February 1921. [Received 5th March 1923.]

These two independent investigations indicate that the ring-necked pheasant is an omnivorous feeder, with a preference for grain when obtainable, and shows very little partiality for grasshoppers or other insects.

The State Entomologist Law and The Pest Law of Colorado.—*Office State Ent. Colorado*, Circ. 32, 15 pp. Fort Collins, Col., April 1921. [Received 5th March 1923.]

The State Entomologist Law makes provisions to prevent the introduction and spread of injurious insects and plant diseases in Colorado; to ensure their extermination, when found in the State; for the inspection of nurseries, nursery stock and orchards; for regulating the sale of insecticides; for a quarantine for infested stock and poisonous plants; and for the control of the alfalfa weevil [*Hypera variabilis*, Hbst.].

The Pest Law, as amended in 1921, provides for the organisation of general measures against insects and other plant pests.

GILLETTE (C. P.) & LIST (G. M.). **Twelfth Annual Report of the State Entomologist of Colorado for the Year 1920.**—*Office State Ent. Colorado*, Circ. 34, pp. 6–37, 4 plates. Fort Collins, Col., June 1921. [Received 6th March 1923.]

The inspection work carried out during 1920 is briefly reviewed, and a list of the quarantines issued is given, no pests of an unusual nature having been intercepted.

Among the insect pests recorded during the year are *Murgantia histrionica*, Hahn (harlequin cabbage bug), which occurred in unusual numbers in eastern Colorado. If it is true that this bug does not survive the winter north of the southern Colorado line, it must have migrated northward approximately 300 miles and covered an area of some 40,000 sq. miles in sufficient numbers to be injurious over most of the area where gardens occur. Serious damage by *Hylemyia* (*Hyalomyia*) *cerealis*, Gill. (western wheat-stem maggot) was recorded to wheat. *Eleodes* sp. (false wireworm) occasionally causes considerable losses to wheat and other grain crops, especially in the dry farming areas of the eastern part of the State. Some damage by Elaterids has also been recorded to these crops. *Rhynchites wickhami*, Ckll. (western rose snout-beetle) is a pest of roses in eastern Colorado, the adults eating small holes in the buds. It is a native of the mountains, where it is common on wild roses. *Phlyctaenia ferrugalis*, Hb. (greenhouse leaf-tyer), has done serious damage to a variety of plants in greenhouses, chiefly to chrysanthemums. *Chionaspis ortholobis*, Comst. (cottonwood scale) is common on poplars and willows and is occasionally taken on aspen [*Populus tremuloides*] and the honey locust [*Gleditschia triacanthos*]. The trunk and large branches are mainly attacked. Young trees or those of low vitality are the most injured, and the scale thrives best on trees grown under crowded conditions. *Diabrotica virgifer*, Lec. (Colorado corn root-worm) is generally distributed over the plains. Where repeated maize crops are grown it often becomes destructive, stunting the growth and destroying so much of the roots and crown that the stalks readily fall in a wind. Maize should not be planted on the same ground two or more years in succession.

During 1920 *Cydia* (*Carpocapsa*) *pomonella*, L. (codling moth) damaged a larger percentage of apples and pears than in any season in the history of the State. A paper read by the senior author at a meeting to discuss a campaign against this pest is given in full. Life-history studies over a four-year period emphasise the importance of making seasonal studies each year in the important fruit-growing sections to determine the best time for spraying. For instance, in 1917 the first eggs of the second generation were deposited on the 25th July, while in 1919 they appeared 20 days earlier. In 1918 the average life-cycle was 61·29 days, in 1919, 48·11 days and in 1920, 54·89 days.

NEWTON (J. H.). **Cottonwood Crown Borer,** *Bembecia tibialis*, **Harris.**—*Office State Ent. Colorado*, Circ. 34, pp. 38–40, 1 plate. Fort Collins, Col., June 1921. [Received 6th March 1923.]

The larvae of *Pennisetia* (*Bembecia*) *tibialis*, Harris (cottonwood crown borer) bore in the cambium layer of poplars just beneath the bark at the base of the tree, or sometimes in the larger root branches three feet from the tree base. This results in a complete girdling of

the tree. The life-cycle has not been completely worked out for Colorado. The larvae mature at the end of July, and the adults emerge about 15th August, early in the morning. The eggs are laid on the tree-trunk near or at the soil surface. No remedial measures can yet be recommended.

Newton (J. H.). **Alfalfa Weevil,** *Phytonomus posticus,* **Gyll. Progress Report**—*Office State Ent. Colorado,* Circ. 34, pp. 40–45, 2 charts. Fort Collins, Col., June 1921. [Received 6th March 1923.]

During 1920 the work upon the alfalfa weevil, *Hypera variabilis,* Hbst. (*Phytonomus posticus,* Gyll.) consisted principally in surveys to determine its spread since the previous year. Injury to the crop was about normal, ranging from slight to 60 and 70 per cent. loss of the first crop, followed by a delay of the second, where remedial measures were not applied. So far spraying is the most economical and successful method tried. One spray was not sufficient to give the desired protection in a field that had not been sprayed previous to 1920 as it had been used to rear the parasite, *Bathyplectes curculionis.* This seems to indicate that there is an accumulative effect derived by spraying in previous years. This parasite has now spread over the entire infested area in certain counties.

Gillette (C. P.) & List (G. M.). **Thirteenth Annual Report of the State Entomologist of Colorado for the Year 1921.**—*Office State Ent. Colorado,* Circ. 36, pp. 5–30, 4 plates, 1 fig. Fort Collins, Col., June 1922. [Received 5th March 1923.]

The Apiary Inspection Act of 1913 and the Pest Inspection Act of 1915 [*R.A.E.*, A, iv, 32] were amended in 1921. The amendments are quoted in full, the more important changes in the Pest Act being chiefly concerned with its local organisation. A brief summary is given of the plant quarantines that have been in effect during the year and of the inspection work carried out.

Tortrix (*Archips*) *argyrospila,* Wlk. (fruit-tree leaf-roller), for the twelfth consecutive year, did serious damage in one county, but parasites were more numerous than usual, especially a Tachinid, *Exorista nigripalpis,* Towns. The percentage of parasitism in three other districts was 22, 38 and 39. Larvae of *Hypsopygia costalis,* F. (clover-hay worm) and their webs did considerable damage to old lucerne stacks by affecting the quality of the hay. Some larvae, thought to be those of a Lycaenid, feeding on apple were received and reared to the pupal stage, but no adults were secured. In 1910 they were recorded on apricots and in 1914 on apples. Large quantities of cabbages were damaged by *Thrips tabaci,* Lind.

In 1905 *Recurvaria pinella,* Busck (pine leaf-miner) was found damaging pines. The larvae usually enter the needle beyond the middle, feeding on the pulpy interior until mature. The pupal stage is passed within the mined needle near the bottom of the burrow. Since 1905 this miner appears never to have been abundant enough to do noticeable injury and was apparently reduced considerably by Hymenopterous parasites. *R. piceaella,* Kearf. (spruce leaf-miner) is a common pest of Colorado blue spruces. Early in November examination of dying needles on silver spruces showed that the larvae hibernate within the leaves that are mined the following spring. It is not yet known whether there is more than one brood in the year.

NEWTON (J. H.). **Sunflower Beetle,** *Cylindrocopturus adspersus,* **Lec.** —*Office State Ent. Colorado,* Circ. 36, p. 30. Fort Collins, Col., June 1922. [Received 5th March 1923.]

Sunflowers were found to be infested with a weevil, *Cylindrocopturus adspersus,* Lec., in 1920. The life-history has not been worked out, as no eggs were obtained from captive adults. The larvae work throughout the entire length of the stalks, and in the late autumn they hibernate in this stage at the base of the stalk. Before pupating they build galleries extending to a point just beneath the epidermis of the stalk. Pupation begins at the end of June, and the adults emerge about the 10th–15th July. After emergence the lower part of the stalk is riddled with numerous circular emergence holes. The stubble and stalks that contain the hibernating larvae should be destroyed.

NEWTON (J. H.). **Alfalfa Weevil,** *Phytonomus posticus,* **Gyll. Progress Report for 1921.**—*Office State Ent. Colorado,* Circ. 36, pp. 30–34, 2 maps. Fort Collins, Col., June 1922. [Received 5th March 1923.]

The work on the alfalfa weevil, *Hypera variabilis,* Hbst. (*Phytonomus posticus,* Gyll.) was carried on in 1921 on the same lines as in the previous year. As spraying had proved a practical success it was recommended to the hay growers, and as dusting had shown considerable promise and has many advantages over spraying, provided that it is as effective, work on these lines is to be continued.

CORKINS (C. L.). **The Pale Western Cutworm,** *Porosagrotis orthogonia,* **Morr.**—*Office State Ent. Colorado,* Circ. 36, pp. 34–35. Fort Collins, Col., June 1922. [Received 5th March 1923.]

Porosagrotis orthogonia (pale western cutworm) has not been considered an important pest of field crops in Colorado. Recently considerable injury, and in some cases complete loss, of winter wheat in certain areas has caused alarm, approximately 3,500 acres being affected. At present no satisfactory measure is known, but there is some evidence that irrigation in the autumn is effective where practicable. As this moth has been in the State for 25 years, there is probably some unknown natural factor that keeps it in check.

CORKINS (C. L.). **Some Notes on the Outbreak of the Long-winged Locust of the Plains in El Paso, Lincoln, Crowley and Pueblo Counties, Colorado, and its Control.**—*Office State Ent. Colorado,* Circ. 36, pp. 35–39, 1 fig. Fort Collins, Col., June 1922. [Received 5th March 1923.]

A brief account is given of an outbreak of *Dissosteira longipennis,* Thomas (long-winged locust) in 1921. No data were obtained as to the date of hatching, but by 24th June there were very few adults; by the 5th July the insects were nearly all in the adult stage, and by the 8th July only a few scattered nymphs were left. The exact date when the migration of nymphs began is not known, and the most obvious factor affecting migration was their great abundance over a restricted area. Adult migration was first observed on the 1st July at a maximum altitude in the air of about 75 feet.

On the 7th July abundant migration northward with the wind was observed, the insects flying at about 500 feet. This species was very easily controlled with poison bran mash. No salt was included in the formula. At first lemons were used and later amyl acetate, apparently with about equal results.

CORKINS (C. L.). **Grasshoppers.**—*Office State Ent. Colorado*, Circ. 36, pp. 39–41. Fort Collins, Col., June 1922. [Received 5th March 1923.]

The outbreaks of grasshoppers in 1921 were in two groups, those found in irrigated valleys and those on dry pasture lands, particularly in the foothills. In the valleys the principal species were *Melanoplus bivittatus* and *M. differentialis*. They hatched in considerable numbers in lucerne fields and then migrated to the market gardens, where water-melons and musk-melons were being chiefly grown. On the eastern slope of the Rocky Mountains much loss was caused to pasture lands, but poisoning operations were not recommended, owing to the low production per acre.

CORKINS (C. L.). **Notes on the Habits and Control of the Western or Mormon Cricket,** *Anabrus simplex*, **Hald.**—*Office State Ent. Colorado*, Circ. 36, pp. 41–55, 2 plates, 2 figs. Fort Collins, Col., June 1922. [Received 5th March 1923.]

The history and distribution of *Anabrus simplex* (western or mormon cricket) are briefly given. The present infestation began in 1918, and in 1920 on one farm half the crops were destroyed, and in 1921 two-thirds. The small percentage of loss as a whole in 1921 was due to the fact that this cricket shows little preference as yet for cultivated plants over its native food. Should, however, the general direction of migration be southward next year and the swarms increase in size, the damage may be considerable.

A list of native and cultivated food-plants is given. Lucerne, Sudan grass [*Sorghum sudanense*] and young wheat are eaten to the ground. Wheat in the ear, rye and oats are stripped of their grain. Most of the crickets feed in the early morning and from four o'clock to sunset. The eggs are laid singly at depths varying from just under the surface to one inch.

Experiments with poison bran mash are described. A bait consisting of 30 lb. bran (free of shorts), 4 lb. crude white arsenic (85 per cent. $AS_2 O_3$), 2 lb. salt, 3 U.S. qts. black-strap molasses, 1 oz. amyl acetate and 4 U.S. gals. water produced a mortality of over 90 per cent. on the second day. This bait also proved to be the most attractive. The mash should be sown broadcast at the rate of 10–12 lb. to the acre, calculated on the dry basis. One application only seems to be necessary, but under general conditions as many as three may be required. Notes on the various birds that prey on crickets are given. No important insect parasites have yet been observed.

L'Arséniate diplombique et sa Préparation comme insecticide.—*Bull. Agric. Algérie-Tunisie-Maroc*, xxix, no. 1, pp. 8–10. Algiers, January 1923.

A study of the lead arsenate mixtures used as remedies for the Colorado potato beetle [*Leptinotarsa decemlineata*, Say] in America had led Dr. Feytaud to the conclusion that those with diplumbic

lead arsenate as a basis (either alone or associated with triplumbic) are more efficacious than those with a basis of triplumbic arsenate only, which in the campaign of 1922 proved to be decidedly defective. The chemical composition and physico-chemical reactions of these substances are explained in a note by M. E. Dufilho.

VIVET (E.). **Premiers traitements contre l'altise et l'eudémis.**—*Rev. Agric. Afr. Nord*, xxi, no. 187, pp. 129–130. Algiers, 2nd March 1923.

When the adults of *Haltica* sp. leave their hibernation quarters to attack the new shoots of vine, a good many of them can be caught in trap shelters constructed of bundles of twigs and straw or other vegetable débris, which should be burnt on a cold morning with the insects that have taken refuge in them. Some vine-growers plant *Andropogon* at intervals along the paths, and then burn it when the vine shoots begin to grow, and many of the insects are sheltering there. The usual arsenical sprays used against *Polychrosis botrana* are also a good remedy for *Haltica*; one or two applications in March and April are generally sufficient for the latter, while for the former weekly treatment during April should be given.

BORG (J.). **Cultivation and Diseases of Fruit Trees in the Maltese Islands.**—vii + 622 pp. Malta, Govt. Printing Office, 1922. Price 4s.

This is a useful work describing the various species of fruit trees grown in the Maltese Islands, with their scientific, Maltese, Italian and French names, and particulars are given as to their history and cultivation. The diseases and insect pests that infest the trees are also dealt with, and in some cases the remedial measures recommended against them are given. Of the insects recorded the more important infest *Citrus*, pears and grape vines.

GRAY (R. A. H.). **Frit Fly on Oats in the four Northern Counties.**—*Jl. Minist. Agric.*, xxix, no. 12, pp. 1109–1114. London, March 1923.

The main features of the life-history of *Oscinella* (*Oscinis*) *frit* as relating in general to the northern counties of England are outlined [*cf. R.A.E.*, A, vii, 68]. Observations during 1922 demonstrate the advantages of early sowing as a preventive measure and indicate that certain varieties of oats appear to have greater power of recovery from attack than others. The resistant varieties vary in the different localities. Spring sowing of oats should be effected in March if possible, but where these crops have decreased annually, they should be replaced by autumn sown oats.

Extra seeding has also given results worthy of further trial in connection with spring sown oats.

SIMMONDS (H. W.). **Establishment of the Citrus Industry in Fiji.**—*Agric. Circ. Fiji Dept. Agric.*, iv, no. 4, pp. 49–51. Suva, October–December 1922.

Until two years ago the export of citrus fruit to New Zealand was prohibited, but shipments are now permitted subject to certain quarantines owing to the presence of *Dacus passiflorae* in Fiji. The regulations require the fruit to be held for at least seven days in

a fly-proof shed and then repacked under Government supervision. The eggs of *D. passiflorae* are laid in the fruit, into which the larvae bore. All diseased fruit should be collected daily and burnt or boiled, and none should be allowed to lie on the ground. The fly lives in many other fruits, the chief of which are kavika [*Eugenia malaccensis*], granadilla [*Passiflora quadrangularis*] and guava [*Psidium guayava*], and these should not be grown near orchards.

Othreis fullonica damages the fruit by piercing and sucking the juices, causing fermentation. The larvae of this moth feed on *Erythrina indica*, and this plant should be destroyed if grown near orchards. A scale, ? *Chionaspis citri*, is fairly common, but is kept in check by Chalcid parasites. *Coccus hesperidum* is more abundant on lemons than on oranges or mandarins [*Citrus nobilis*]. *Icerya purchasi* and *Aspidiotus aurantii* have been recorded on both oranges and lemons. *Papilio schmaltzi* occasionally deposits eggs on lemon, but is rare and more often uses *Micromelum pubescens* as a food-plant. The bug, *Mictis profana*, sometimes damages the young shoots of orange trees and requires picking by hand.

SIMMONDS (H. W.). **Entomological Notes.**—*Agric. Circ. Fiji Dept. Agric.*, iv, no. 4, p. 52. Suva, October–December 1922.

The scale-insects recorded on coconuts in Fiji are *Aspidiotus destructor*, Sign., *A. cocotis*, Newst., *A. palmae*, Ckll., *Hemichionaspis minor*, Mask., *Coccus hesperidum*, L., and *Pseudococcus cocotis*, Mask.

Larvae of *Platyedra* (*Gelechia*) *gossypiella*, Saund., have been recorded for the first time infesting seed pods of *Hibiscus tiliaceus*. Other cotton pests are *Anomis flava*, the pupae of which have been found in ripe open cotton bolls, and the larvae of which probably feed on the leaves; *Pyroderces euryspora*, Meyr., and *Hieroxestis aurisquamosa*, Butl., from ripe cotton bolls, probably rubbish feeders; and *Saissetia nigra*, Nietn., which is not uncommon on cotton and is the only cotton scale of economic importance at present in Fiji.

SIMMONDS (H. W.). **Spread of** *Levuana iridescens*.—*Agric. Circ. Fiji Dept. Agric.*, iv, no. 4, pp. 52–53. Suva, October–December 1922.

Some further notes are given on the history of *Levuana iridescens* in Fiji [*R.A.E.*, A, x, 38]. The whole of the coconut districts of Fiji are seriously menaced by the spread of this moth to the Ovalau Group, and the author considers that drastic steps should be taken to drive it back to the mainland.

VERESHTCHAGIN (B.). **Щитковыя тли и мѣры борбы съ ними.** [Coccids and their Control.]—**Фурника** [*Furnika*], no. 3, pp. 14–16. Kishinev, 13th February 1923.

A general account is given of Coccids and the injury caused by them to fruit trees. Those recorded from Bessarabia include *Aspidiotus ostreaeformis*, Curt., on pears and plums; *Lepidosaphes ulmi*, L., on apples; *Eulecanium* (*Physokermes*) *coryli*, L., on plums; *Aspidiotus hederae*, Newst., on greenhouse plants; and *Eulecanium* (*Lecanium*) *robiniarum*, Dougl., on white acacia [*Robinia pseudacacia*].

The natural enemies include the Coccinellids, *Exochomus quadripustulatus*, L., and *Chilocorus bipustulatus*, L.

The usual remedies, such as spraying with lime-sulphur or kerosene emulsion, are recommended.

PATTERSON (W. H.). **Report of the Entomologist.**—*Gold Coast: Rept. Agric. Dept. 1921*, pp. 27–30. Accra, 1922.

The chief pests of cacao in the Gold Coast are the bark-sappers *Sahlbergella singularis*, Hagl., and *S. theobromae*, Dist. An unidentified Hymenopterous parasite has been discovered, but is not thought to be of great value in control. A very high percentage of pods are destroyed, and the trees are greatly weakened and rendered liable to attack by fungi. An insect that has been very numerous on stems of *Anona squamosa* will probably prove to be a new species of *Sahlbergella*. *Helopeltis bergrothi*, Reut. (cacao mosquito) has caused considerable damage. Working on the lines of Andrews' experiments to determine the relations of soil conditions to the attacks of *Helopeltis* on tea, a chemical survey of the soils on which cacao is grown has been started, and tentative work has also been done to ascertain whether cacao trees can be injected with potash solutions; no definite conclusions have as yet been reached. The cacao thrips [*Heliothrips rubrocinctus*, Giard] is apparently increasing and threatens to become a serious pest. *Acalypha* is a preferred food-plant, and this should not be planted round cacao estates. *Homoeocerus* sp. (big bug) occurs, but the extent of injury is not known. *Characoma stictigrapta*, Hmps. (pod borer) and, to a less extent, *Glenea* sp. (stem bark-borer) are reported as pests from some localities.

Pests of kola [*Cola acuminata*] include the fruit-fly, *Ceratitis colae*, Silv., which seems to be an exclusive pest of this crop, the larvae living in the seed coat. An attempt is being made to discover how the pest survives when no kola pods are available, as control of this fly would reduce the injury from the kola weevil, *Balanogastris colae*, Desbr. The most feasible method of combating the fruit-fly would be by means of parasites, but as indigenous ones seem to be practically non-existent, an attempt will be made to obtain parasites of other fruit-flies. The weevil rarely, if ever, attacks uninjured trees, but prefers the pods that have fallen to the ground, provided that there is some opening that permits of its entrance. The natives are said to use a cold extract of the bark of *Rauwolfia vomitoria* with the juice of *Carica papaya* as an insecticide to sprinkle the nuts; the effect of this mixture will be tried. It is also intended to test the value of fumigation. If no fallen fruit or culls were allowed to remain on the ground, weevil injury would probably be reduced to a minimum. A fungus, which is being studied, appears to reduce the numbers considerably. Alternative food-plants have not been found, but the weevils were on one occasion captured in large numbers feeding on the flowers of *Hibiscus*.

On coconut palms, the rhinoceros beetle, *Archon centaurus*, Burm., has markedly decreased, though both this and the weevil, *Rhynchophorus phoenicis*, F., have been troublesome in a few instances. The leaf scale, *Aspidiotus destructor*, Sign., has been reported as a pest several times, but is generally checked by the Coccinellids, *Chilocorus* sp. and *Scymnus* sp. and by the fungi, *Sphaerostilbe coccophila*, *Cephalosporium lecanii*, and an unnamed brown species. Larvae of the Hesperid butterfly, *Pyrrhochalcia iphis*, Dr., were in one instance very destructive to the leaves, but were eventually controlled by parasites. On oil palms *R. phoenicis* and the Hispid beetle, *Coelaenomenodera elaeidis*, Maul., have given trouble; and the latter has been found on seedling coconuts and on young royal palms.

Minor pests include the fruit moth, *Othreis* (*Ophideres*) *fullonica*, L., *Leptoglossus* sp. (paddle-legged bug) and a Halticid beetle, *Cercyonia citri*, Bryant, on *Citrus*, and a beetle, probably *Stenodontes* sp. on Para rubber.

Some attempts are being made to domesticate wild honey-bees, and it is thought that with more modern methods a successful industry might be established.

LEIBY (R. W.). **Biology of the Goldenrod Gall-maker** *Gnorimoschema gallaesolidaginis*, **Riley.**—*Jl. N. Y. Ent. Soc.*, xxx, no. 2, pp. 81–94, 1 plate, 1 fig. Lancaster, Pa., June 1922.

An account is given of the life and seasonal history of *Gnorimoschema gallaesolidaginis*, Riley, as studied in Vermont, New York and North Carolina. This moth makes elliptical galls on the stems of goldenrod [*Solidago*]. The time of appearance and the length of the stages vary considerably in the different regions.

Among the numerous parasites of it that have been reared are *Copidosoma gelechiae*, How., *Calliephialtes notanda*, Cress., *Scambus pterelas*, Say, *Phaeogenes gelechiae*, Ash., *Campoplex dimidiatus*, Cress., *Microgaster gelechiae*, Riley, and *Eurytoma* sp., probably *E. bolteri*, Riley, which is itself parasitised by *Pleurotropis* sp. Among other species not yet determined, one is probably *Pseudacrias sexdentatus*, Gir., and another is a gregarious Braconid.

MENZEL (R.). **Over de biologische bestrijding van** *Helopeltis*. [The Biological Control of *Helopeltis*.]—*Meded. Proefst. Thee*, no. 81, pp. 21–23. Buitenzorg, 1922. (With a Summary in English.) [Received 3rd March 1923.]

Since the beginning of 1921 the author has investigated the extent of infestation of *Helopeltis* by Nematode worms of the genus *Mermis* [*R.A.E.*, A, ix, 493; x, 175]. In India only 2 or 3 per cent. of these Capsids are infested, and there is no prospect of the parasite being of practical value. Improved methods of tea cultivation are likely to play the chief part in the control of *Helopeltis*.

COHEN STUART (C. P.). **Iets over den steek van** *Helopeltis*. [On the Punctures made by *Helopeltis*.]—*Meded. Proefst. Thee*, no. 81, pp. 24–25. Buitenzorg, 1922. (With a Summary in English.) [Received 3rd March 1923.]

To ascertain if *Helopeltis* prefers certain parts of the tea-leaf, microtome sections of injured leaves were made and stained with safranine. These show a large area killed and collapsed, taking a rich red stain, which indicates that the toxic fluid from the insect is probably acid. The exact puncture is visible only in preparations made immediately after attack. The proboscis appears to pierce the epidermis and penetrate to the vascular bundle. If the proboscis is severed during the act of sucking, it is in every case found touching a vascular bundle. This throws a new light on the tastes and habits of *Helopeltis*. Aphids are stated to insert their sucking apparatus into the phloem, where the sugars and albumens are being transmitted.

van Hooff (H. W. S.). **Snoeien en** *Helopeltis*. [Pruning and *Helopeltis*.]—*Meded. Proefst. Thee*, no. 81, pp. 26–31. Buitenzorg, 1922. [Received 3rd March 1923.]

On one estate the author has practised for five years the method of pruning tea in alternate rows and states that for some years nothing has been expended on controlling *Helopeltis*. It has been noticed that even in a severely infested tea plantation *Helopeltis* almost disappears when the time for pruning (*i.e.*, two years after the previous pruning) approaches. No explanation is available, but it is apparent that general pruning destroys the circumstances unfavourable to the pest, while pruning in alternate rows means that 50 per cent. of the unfavourable circumstances are retained. In practice the author begins by pruning one row, so that the next one, which is untouched, represents a growth two years older as regards pruning. In the following year the previously untouched row is pruned, when the one previously pruned represents a pruning one year old.

Bernard (C.). **De snoeimethode van Tjiboengoer. De bestrijding van** *Helopeltis* **op Tjiboengoer.** [The Tjiboengoer Pruning Method. The Control of *Helopeltis* on the Tjiboengoer Estate.]—*Meded. Proefst. Thee*, no. 81, pp. 32–35. Buitenzorg, 1922. [Received 3rd March 1923.]

The control of *Helopeltis* lies in every direction that goes to produce vigorous tea plants. Direct measures against the Capsid are but a part of this. While admitting the real value of the method of pruning alternate rows (described above), it is pointed out that the bushes on the estate in question are stated to be free from rust and that this is necessary if the method is contemplated. This method is capable of excellent results where the plants are vigorous and the infestation is confined to certain parts of the plantation.

Garretsen (A. J.). **Het snoeien om de andere rij ter bestrijding van** *Helopeltis*. [The Pruning of alternate Rows as a Measure against *Helopeltis*.]—*Meded. Proefst. Thee*, no. 81, pp. 36–39. Buitenzorg, 1922. [Received 3rd March 1923.]

The method described above is effective if the following conditions are fulfilled. The gardens must be practically free from *Helopeltis* at pruning time; at least two years must have elapsed since the previous pruning; in pruning alternate rows, the second row must not be pruned within one year after the first one; bushes under 5 feet in height must be left unpruned so that they may become vigorous by the time their row is again pruned two years later; top-pruning is useless; plucking must be carefully done; the planting of *Albizzia* or other green manures is necessary; and soil cultivation must be adapted to the method of pruning.

van Hooff (H. W. S.). **De op Tjiboengoer genomen Maatregelen tegen** *Helopeltis*. [The Measures against *Helopeltis* taken at Tjiboengoer.]—*Meded. Proefst. Thee*, no. 81, pp. 40–44. Buitenzorg, 1922. [Received 3rd March 1923.]

Very convincing crop figures are given as to the value of alternate row pruning. The author suggests that this measure interferes with the habits of *Helopeltis* by admitting light to its usual diurnal hiding-places in the tea bushes.

Sloos (A. R.). **Aanvullende inlichtingen over de Tjiboengoer-methode.** [Supplementary Information on the Tjiboengoer Method against *Helopeltis*.]—*Meded. Proefst. Thee*, no. 81, pp. 45–46. Buitenzorg, 1922. [Received 3rd March 1923.]

Further information on the value of the pruning of alternate rows is given. In one experiment Heer van Hooff placed 1,000 *Helopeltis* on a batch of tea bushes that had all been pruned, and a similar batch on a batch of bushes pruned alternately. At first the infestation and injury were equal on both batches, but in two months' time the alternately-pruned batch was almost free from *Helopeltis*, whereas the other bushes continued to suffer fresh injury, proving the presence of a lasting infestation.

Boode (F. J. C.). **Van Hooff's Om-De-Andere-Rij-Snoeisysteem tegen** *Helopeltis*. [The van Hooff System of Alternate Pruning against *Helopeltis*.]—*Meded. Proefst. Thee*, no. 81, pp. 47–49, 1 plate. Buitenzorg, 1922. [Received 3rd March 1923.]

This method is recommended as being both effective and cheap, and is described as follows: In a sound plantation (the presence of a few bushes injured by *Helopeltis* is immaterial) with bushes that are 56 inches high the first row is pruned down to 2 feet from the ground. The side shoots below this are left. The centre of the bush is kept open. After eight months the tops of the bushes are pruned down to a height of 48 inches, green wood being removed as well as older wood. After a further four months a third pruning is done at 56 inches —the green wood being cut—and at the same time the second row of bushes (the alternate unpruned row) is pruned to 2 feet from the ground in the manner already described. After a further four months the fourth pruning is done at a height of 64 inches, the green wood being again cut. Then the bush is allowed a period of rest of eight months. Two years have then elapsed since the low pruning at 2 feet and the latter is then repeated.

Plucking must only be done when the pruned bushes again have a full crown. No plucking must take place during the period of rest between the 16th and 24th months of the pruning cycle.

Fletcher (T. B.) & Inglis (C. M.). **Some Common Indian Birds. No. 19. The Common Indian Bee-eater** (*Merops orientalis*). —*Agric. Jl. India*, xviii, no. 1, pp. 1–5. 1 plate. Calcutta. January 1923.

The food of the common Indian bee-eater, *Merops orientalis*, consists almost entirely of flying insects taken on the wing, large numbers of queen bees being taken whilst on the marriage-flight. In view of its habits this bee-eater does not seem to deserve the protection throughout the year which it at present enjoys in Bombay, Bengal, Assam and Burma.

Ballard (E.) & Norris (D.). **Bacterial Infection of Cotton Bolls.**—*Agric. Jl. India*, xviii, no. 1, pp. 40–49. Calcutta, January 1923.

Considerable loss is caused to the cotton crop in India owing to the rotting and premature fall of young bolls. This is due to a bacterial disease that cannot be traced to any fungous origin. Insects are

apparently an important factor in disseminating the disease, as they afford a ready means of entrance to the plant, but whether they are absolutely necessary has not yet been proved. The two species that are most likely to be implicated are two recently described Capsids, *Ragmus morosus*, Ballard, and *R. flavomaculatus*, Ballard [*R.A.E.*, A. x, 295]. The fact that boll-shedding declines with the partial disappearances of these two Capsids from the field tends to indicate their connection with the disease. Moreover, no cotton-stainers [*Dysdercus*] were observed in the district examined, and the bolls that fell were almost all very small ones, while in another district infested with stainers the diseased bolls were much larger, corresponding with the size of the stainers as compared with the Capsids. If remedial measures prove necessary, it is thought that insecticidal treatment may be sufficient, but it will be important to ascertain whether other plants serve as food for the insects implicated in the spread of the disease.

Ramakrishna Ayyar (T. V.). **Some Insects noted as Pests of Fruit Trees in South India.**—*Agric. Jl. India*, xviii, no. 1, pp. 50-59. Calcutta, January 1923.

The possibilities of a successful fruit industry in the Madras Presidency are very great, but at present fruit-growing is carried on with but little system or organisation. In view of the expected extension and improvement of the industry, the insects that are known to be injurious to native fruits are briefly dealt with under the head of the fruit attacked. They include :—on mango, *Idiocerus* spp. (mango hoppers), *Batocera rubus* (mango stem-borer), *Dacus* (*Chaetodacus*) spp. (fruit-flies), *Parasa lepida* (common nettle grub), *Apoderus tranquebaricus* (leaf-twisting weevil), *Cryptorrhynchus mangiferae* (mango weevil), which is not an important pest, and various Coccids ; on *Citrus*, the orange borer beetles, *Chloridolum alcmene* and *Chelidonium cinctum*, *Papilio demoleus* (orange butterfly), *Phyllocnistis citrella*, *Toxoptera aurantii* and *Ophideres fullonica* ; on pomegranate, *Virachola isocrates* (pomegranate butterfly) and the caterpillar of *Euproctis fraterna* ; and on jak [*Artocarpus integrifolia*], mealybugs (*Icerya* and *Pseudococcus*) and the shoot-boring caterpillar of *Glyphodes caesalis*. Bananas have as minor pests the caterpillars of *Pericallia ricini*, *Parasa lepida* and *Prodenia litura* ; *Cosmopolites sordidus* (banana borer) has only been found in a few places in South India and is not yet a serious pest. On grapes, the Eumolpid, *Scelodonta strigicollis*, is practically a specific pest, and minor pests are cockchafers, Sphingid caterpillars (*Hippotion* spp.) and Coccids (*Pulvinaria* sp. and *Aspidiotus cydoniae*). On guava, *Pulvinaria psidii*, and on melons, fruit-flies and *Glyphodes indica* (leaf caterpillars) and *Aulacophora* spp. (leaf beetles) do considerable damage. Other pests include *Aspidiotus* spp. on tamarind [*Tamarindus indica*] ; *Pseudococcus bromeliae* on pineapple ; the Longicorn, *Olenecamptus bilobus*, the caterpillars of *Ocinara varians*, mealybugs and scales on edible figs ; and the fruit-fly, *Carpomyia vesuviana*, on *Zizyphus*.

Very little is known about the imported pests of introduced fruit plants, but *Eriosoma* (*Schizoneura*) *lanigerum* (woolly apple Aphid) has gained admission and is beginning to assert itself.

Remedial measures against these pests have scarcely been studied or practised at all, but the main principles on which all remedial measures may be based are briefly discussed.

Sen (P. C.). **The Litchi Bark-borer** (*Arbela tetraonis*, **Moore**).—*Bengal Agric. Jl.*, ii, no. 2, p. 84, 1 plate. Dacca, September 1922.

Arbela tetraonis, Moore (litchi bark-borer) is sometimes injurious to fruit trees, especially mango and litchi. The larva bores into the trees, generally in the joints of branches, feeding on the bark and constructing a covering of silk and wood fragments as it proceeds. The eggs have not yet been found, but are probably laid singly in crevices in the bark. The larvae feed on the bark at night, and when full-grown, pupate within the gallery. When possible, the caterpillars should be caught by suddenly removing the covering under which they hide. Injections of turpentine into the holes kill practically all the borers.

de Baillon (P. C.). **I. Contribution anatomique et physiologique à l'étude de la reproduction chez les Locustiens et les Grilloniens. II. La ponte et l'éclosion chez les Grilloniens. Conclusions générales.**—*La Cellule*, xxxii, no. 1, pp. 7–193, 5 plates. Louvain, 1922.

The contents of this paper are indicated by its title.

Décret du 13 février 1923 concernant les mesures à prendre pour arrêter les progrès du *Doryphora*.—*Jl. Agric. Prat.*, xxxix, no. 10, pp. 196–197. Paris, 10th March 1923.

These regulations have been issued in substitution for Section ii of a decree of 26th December 1878. They provide that as soon as the presence of the Colorado potato beetle [*Leptinotarsa decemlineata*, Say] has been notified in any locality, an inspector shall be sent to verify the information, and he will define the region of infestation and the protection zone that must be maintained around the infested region. The officially prescribed treatment will then be undertaken, and, if ineffective, will be followed by the destruction of the crop infested or menaced by the beetle, and proportionate compensation will be given. It is forbidden to send to uninfested areas any plants susceptible to attack by *L. decemlineata* originating from the regions declared to be infested, any leaves or débris of such plants, or any boxes, bags or packing that have been used in connection with them. Any packing material used in this connection must be cleaned and disinfected.

Control of Root Maggots.—*Ann. Rept. New Hampshire Agric. Expt. Sta. 1920–21*, Bull. 203, pp. 11–13. Durham, N.H., January 1922. [Received 13th March 1923.]

In investigations into the control of the cabbage maggot [*Phorbia brassicae*] a marked efficiency has been obtained from a tobacco-dust-lime mixture, made of equal parts of finely ground tobacco-dust and limestone, commonly known as agricultural lime. The investigations for 1920–21 prove that eggs brought in contact with this mixture show the occurrence of definite insecticidal action. Larvae failed to reach the roots of treated plants for several days, though later increasing numbers appeared. This fact will have a definite bearing on the eventual use of the treatment, as the most serious damage is caused by the larvae that reach the roots before the plant is well established. The addition of moisture to simulate rain, after

newly-deposited eggs had been placed in contact with the mixture, resulted in a hatch of 16 per cent. as compared with a hatch of 93 per cent., where the eggs were placed in contact with soil, and water added. Where eggs were placed on soil and wetted with an infusion made by permitting the mixture to stand in water, the percentage of eggs that hatched was nearly as great as that of control plots. Inconclusive results were obtained from experiments to determine whether the larvae and pupae are killed by infusions of the mixture carried down through the soil. Oviposition began promptly on untreated plants, the number of eggs deposited increasing till 199 had been laid on 25 plants at the 14th day. On treated plants in one lot two eggs were found on the 8th day and in the other lot one egg on the 11th day. Heavy rains appear to reduce the efficiency of the mixture, but further treatment four days after rain gave protection. A poison bait of banana pulp and sodium arsenite did not prove effective in reducing egg-laying to any marked degree, especially as the season progressed.

Amendment to the Regulations under the Destructive Insect and Pest Act, Amendment no. 18 (No. 1 of 1923).—*Canada Dept. Agric.*, 1 p. Typescript, Ottawa, Ont., 1st March 1923.

To prevent the introduction of the Japanese beetle [*Popillia japonica*, Newm.] and other soil-infesting insects into Canada, an Order in Council dated 26th February 1923 prohibits the importation of nursery stock, including all plants for ornamental purposes or propagation, from Asia, with soil or sand about their roots. Bulbs and corms, however, may be packed in sand or soil that has been properly sterilised, if accompanied by a certificate to that effect. In the case of shipments from Japan, subsoil may be used for packing bulbs and corms if accompanied by a certificate from the Director of the Imperial Plant Quarantine Station stating that certain conditions have been fulfilled.

The Cotton Ordinance, 1920.—Government Notice, No. 287, 8 pp. Dar-es-Salaam, 28th December 1922.

These rules for Tanganyika Territory, to be cited as The Cotton Rules, 1922, revoke those of 1920 [*R.A.E.*, A, x, 273]. No cotton seed may be imported except under licence, and any cotton grown by natives must be from seed obtained from the Director of Agriculture, who alone may supply natives with seed. The Governor may prohibit the removal of seed from quarantine areas and may seize and destroy any seed. No cotton may be planted upon land upon which cotton has been growing during the two preceding years. Plantations must be kept free from weeds, grass and pests, and any disease or pest must be notified. Annual uprooting and burning of cotton plants after harvest is compulsory. The Director of Agriculture has access to plantations, may remove samples of soil, etc., for examination and directs what action is to be taken when disease or pests exist. Cotton may not be bought, except at an official market, without a special licence. A licence must also be obtained for ginning and baling cotton. All ginneries and other premises containing cotton must be kept clean and are liable to inspection. Seed cotton from hand-ginned cotton must be destroyed. The Governor may authorise compensation to be paid for anything done under these rules.

LOVETT (A. L.) & BARSS (H. P.). **Orchard Spray Program for Oregon.** —*Oregon Agric. Coll.*, Extens. Bull. 356, 15 pp., 6 figs. Corvallis, Oregon, January 1923.

As there is considerable climatic difference between the more humid orchard sections west of the Cascade Mountains and the semi-arid or arid irrigated regions of Oregon, a different spray programme is arranged to meet the conditions as regards pests and diseases in each. Special notes are given on particular pests, with general instructions about sprays and spreaders. Attention is drawn to the success that has been obtained with sulphur dust, which can be readily mixed with water and used as a spray. The best dry mixture for this purpose consists of 8 lb. of finest dusting sulphur, 4 lb. hydrated lime and 6 or 8 oz. of powdered calcium caseinate spreader, which makes enough for 50 gals. of spray. This can be used where lime-sulphur is likely to produce injury to foliage.

LOVETT (A. L.) & BARSS (H. P.). **Spray Program for Pacific Northwest.** —*Better Fruit*, xvii, no. 8, pp. 7–8 & 19, Portland, Oregon, February 1923.

This information has been noticed from another source [see preceding paper].

SEVERIN (H. C.). **Department of Entomology.**—*South Dakota Agric. Expt. Sta., Ann. Rept. 1920–21*, pp. 24–28. Brookings, S. Dak. [n.d.] [Received 13th March 1923.]

Work is described in connection with *Neurotoma inconspicua*, Nort., the web-spinning sawfly of plum and sand cherry [*R.A.E.*, A, ix, 236] and with the common field cricket of S. Dakota, *Gryllus assimilis* [*R.A.E.*, A, ix, 237; x, 367]. A revised list is given of the food-plants of *Meromyza americana* (wheat stem maggot). During 1920–1921 15 per cent. of injury from this fly was recorded in wheat, 2–4 per cent. in barley, less than 1 per cent. in oats, and 10–15 per cent. in spring rye. Experiments with oils to attract the flies all proved negative; it is still hoped, however, to obtain a successful poison bait. Meantime, cultural methods, such as hand-picking infested plants, rotation of crops and destruction of self-sown plants and weeds, will be thoroughly undertaken.

JARVIS (H.). **Fruit Fly Investigations.**—*Queensland Agric. Jl.*, xix, pt. 1, pp. 1–4. Brisbane, January 1923.

An unsuccessful search was made in November for *Dacus ferrugineus* (*Chaetodacus tryoni*) in native fruits. In the case of cherries it has been found that usually two eggs of this fly, seldom more than three, are laid in each puncture, but in apples as many as eight and seldom less than five, have been recorded. In 12 fly-punctured apples, however, only four punctures were found to contain eggs. The development of larvae in hard unripe apples must be slow, and probably many eggs laid in such fruit fail to hatch or the larvae perish through inability to break down the hard fruit-tissues and secure nourishment.

During November cutworms and other caterpillars have been destructive to vegetables, especially *Heliothis obsoleta* (*Chloridea armigera*) to tomato plants. Probably an arsenical spray early in the growth of the plant, followed by a similar spraying at fortnightly

intervals for two months or six weeks, might be effective. A poison bait for *Agrotis* spp. has already been noticed [*R.A.E.*, A, v, 175]. Under dry conditions salt at the rate of 5 lb. to 50 lb. bran will keep the bait moist and make it more effective.

A Chrysomelid, *Rhyparida* sp., has considerably damaged the fruit and foliage of apple. It should be fairly easily controlled with the usual codling moth lead arsenate spray.

Jarvis (E.). **Cane Pest Combat and Control.**—*Queensland Agric. Jl.*, xix, pt. 1, pp. 16–18, 1 plate. Brisbane, January 1923.

The drought of 1915 is compared with that of 1922 as regards the mortality of grey-backed beetles (*Lepidoderma albohirtum*, Waterh.), the adults of which are unable to remain alive in certain soils in dry weather for longer than 9 or 10 weeks. If the present drought continues, many adults will perish in the soil. The season of 1922–23 will see the appearance of vast numbers of *Lepidiota frenchi*, Blackb., which has a two years' life-cycle. Third-stage larvae are usually destructive to sugar-cane from August to November. They remain a year longer in the larval condition than *Lepidoderma albohirtum*, for which they are sometimes mistaken. The importance of clean culture in sugar-cane areas during December and January is emphasised.

Experiments in breeding *Ceromasia sphenophori*, Vill., the Tachinid parasite of *Rhabdocnemis obscura*, Boisd. (beetle borer) are described. These flies will be liberated free of charge on heavily infested plantations on condition that the owner will agree to leave at least half an acre of badly bored unburnt cane for the parasites to breed in.

Attempts to procure more examples of *Apanteles nonagriae*, Ol., the parasite of *Phragmatiphila truncata*, Wlk. (large moth borer of sugar-cane) have not been successful. Parasites will be bred from caterpillars collected in December, as it is the later broods that are the most freely parasitised.

Benson (A. H.). **Orange Sucking-bugs.**—*Queensland Agric. Jl.*, xix, pt. 1, pp. 33–35. Brisbane, January 1923.

During the last few years *Oncoscelis sulciventris* (bronze orange bug) and *Biprorulus bibax* (green or spiny orange bug) have increased in numbers and destroyed large quantities of fruit and young growth. They are confined to Queensland and the northern coast districts of New South Wales. Prior to the introduction of cultivated *Citrus* they fed on native species as well as other plants belonging to the order Rutaceae. These plants still provide breeding-places, and the adults fly from them to cultivated orchards.

Eggs are deposited in clusters of 10–12 on the leaves of *Citrus* or other food-plants. Under local conditions the bugs become mature in about a month. They suck the stem or skin of the fruit and young growths. The best measures are the destruction of all food-plants and the collection in July of all egg clusters and young bugs. Oil or caustic sprays should be regularly used against the larvae. At daybreak they may be easily shaken on to a cloth placed under the tree. In all cases prompt action is very necessary.

Aldrich (J. M.). **A new Sugar-cane Miner.**—*Bull. Brooklyn Ent. Soc.*, xviii, no. 1, pp. 22–23. Brooklyn, N.Y., February 1923.

A new fly, *Ectecephala tripunctata*, sp. n., is described from wild sugar-cane in Costa Rica.

MILLIKEN (F. B.) & WADLEY (F. M.). U.S. Bur. Ent. *Phasia (Phorantha) occidentis*, **Walker, an internal Parasite of the False Chinch Bug.**—*Bull. Brooklyn Ent. Soc.*, xviii, no. 1, pp. 28-31. Brooklyn, N.Y., February 1923.

The Tachinid, *Phasia occidentis*, Wlk., was first reared from *Nysius ericae*, Schill. (false chinch bug) in 1913. The characters and distribution of this fly are discussed. The egg has not been observed. The larva lives in the abdominal cavity of *N. ericae*, and has been recorded from other species. The females are more often parasitised than the males, and only one larva is found in each host. It is probable that infestation occurs in the later nymphal stages or at the time of the last moult, and that the combined egg and larval periods of the parasite require 15-18 days. On emerging from the host the larva pupates in loose surface soil and rubbish. At summer temperatures the pupal period lasts 5-7 days, but in May and September it varies from 8 to 11 days. The adult only lives about 3 days in captivity. Pairing takes place soon after emergence. Infestation has not been observed in the field, and repeated efforts to secure it experimentally have failed. The whole life-cycle requires about 25 days, allowing for a pre-oviposition period, and bears a close relation to that of the host. The fly appears almost as early in the spring as *N. ericae*, remaining active from May to October. Hibernation is probably passed in the pupal stage In Kansas the parasite kills a constant percentage of the females, and with few exceptions parasitised females deposit no eggs, but it can only be considered a minor check on *N. ericae.*

O'KANE (W. C.). **Diffusion of Carbon Bisulphide in Soil.**—*New Hampshire Agric. Expt. Sta.*, Tech. Bull. 20, 36 pp., 21 figs. Durham, N.H., June 1922. [Received 13th March 1923.]

The technique of experiments to determine the rapidity of diffusion of carbon bisulphide in soils of various textures is explained, the insects used in the tests being the common mound-building ant, *Formica exsectoides*. The results of the experiments are shown in a series of charts. When carbon bisulphide was applied at the surface of the soil (in a box providing a 6-inch cube of soil), the ants did not succumb with less than a 5-dram dose, and even at this dosage they survived in coarse soil. The poison applied diagonally downward showed a more rapid response to gravity in coarse soil. When applied at a depth of 6 inches in fine soil, the poison was fatal in 2-dram doses, but in coarse soil even 4 drams failed to kill all the ants. Lateral diffusion seemed to take place with equal rapidity and efficiency in fine and coarse soil. There is apparently a distinct interrelation of the factors of gravity and of soil texture as shown by the behaviour of the material when applied at the surface and when applied 3 inches down in fine soil, as contrasted with coarse soil. When the poison was applied at the surface and the soil immediately covered with carpet, it was more effective, especially in medium or coarse soil.

A further series of tests was carried out to determine the killing zone of the poison. The insects used in this case were the larvae of *Tenebrio molitor*, the technique employed being different. The results are shown in charts, and, as a whole, it is found that, with insects at various points beginning just beneath the surface and extending to a depth of 6 or 8 inches, the most effective killing zone is obtained by applying carbon bisulphide at a depth of not less than 2 and not more than 4 inches. At a depth of more than 4 inches there will be

failure to kill all insects situated within 2 inches of the surface, and at a depth of less than 2 inches there will not be sufficient diffusion diagonally downward.

For comparison with the above, the following field data are given. Early radishes infested with radish or cabbage maggots [*Phorbia brassicae*] were treated with carbon bisulphide, holes about 3 inches deep being made with a pointed stick every 2 or 3 feet along the rows, and either 2 or 4 drams of the poison poured into each. After 5 days it was found that the 2-dram dose failed to kill all maggots at a distance of 1 inch and killed only a few at 2 inches or more. Applications of 4 drams killed all insects within 2 or 3 inches. The percentage killed diminished materially at 4 inches and became negligible at 6 inches and beyond.

SANDERS (J. G.). **Whither in Entomology.**—*Jl. Econ. Ent.*, xvi, no. 1, pp. 31–39. Geneva, N.Y., February 1923.

In this presidential address attention is drawn to the need of reviewing the prospects of entomology. Various lines of improving its status in the future are pointed out; these include the education of the coming generation by introducing entomology as a study in the public schools, particularly in the lower grades.

FELT (E. P.). **Problems in Economic Entomology.**—*Jl. Econ. Ent.*, xvi, no. 1, pp. 39–45. Geneva, N.Y., February 1923.

An outline is given of the annual expenditure of the Federal Quarantine Service, and suggestions are made for its improvement and the possible resulting reduction of costs. The advisability of attempting the extermination of the recently introduced camphor scale, *Pseudaonidia duplex*, Ckll., is urged, as well as the prevention of the further spread of the gipsy moth [*Porthetria dispar*, L.] along the eastern boundary of New York State.

Entomological problems require the consideration of experts, but when a policy has been agreed upon by a representative group of qualified entomologists, it should receive the whole-hearted support of the executives, unless the latter are prepared to accept the responsibility of inaction or modification.

BRUES (C. T.). **Choice of Food and Numerical Abundance among Insects.**—*Jl. Econ. Ent.*, xvi, no. 1, pp. 46–51. Geneva, N.Y., February 1923.

Insects may be polyphagous, oligophagous or monophagous; and the bearing of these habits on their survival and numerical abundance is discussed. Natural conditions are not as a rule favourable to the maintenance of such large numbers in the case of those with monophagous habits.

The numerical abundance of insects depends almost entirely on factors that tend to limit the powers of reproduction. These are discussed, and include the prevalence of disease, insect parasites, and the extent of the available food supply.

GRAHAM (S. A.) & RUGGLES (A. G.). **The Obligation that Economic Entomology owes to Forestry.**—*Jl. Econ. Ent.*, xvi, no. 1, pp. 51–61. Geneva, N.Y., February 1923.

The attention of economic entomologists in the past has been devoted in the main to pests of agriculture, and in the few cases in which the

insect enemies of forests have been considered the studies have been chiefly devoted to their biology, their control being considered beyond the power of the entomologist under existing circumstances. The losses due to these forest pests represent enormous sums ; thus, it is estimated that from 1905 to 1925 those due to the larch sawfly [*Lygaeonematus erichsoni*, Hart.] and spruce budworm [*Tortrix fumiferana*, Clem.] in North America will amount to at least £60,000,000.

The most important problem in Minnesota at present is the protection of balsam and spruce from outbreaks of the spruce budworm. Under present conditions repeated outbreaks may be expected every 30–50 years.

The forest tent caterpillar [*Malacosoma disstria*, Hb.] is increasing in importance, partly as a result of the extension of birch and aspen forests.

Other problems requiring consideration include that of the larch sawfly [*Lygaeonematus erichsoni*, Hart.] and the pests of freshly cut timber, particularly pulpwood.

Although mechanical means of control, even if applicable, may not be practical, there is no reason to consider control impossible, as attack may surely be limited if not actually prevented by silvicultural control. Generally speaking, mixed stands of balsam fir, spruce and hardwoods are much less susceptible to injury than pure or nearly pure stands.

In the discussion following this paper A. F. Burgess pointed out the need for a more thorough study of natural control agencies and the utilisation of natural enemies in dealing with some of these problems.

E. P. Felt drew attention to the desirability of securing better protection of bird life in connection with the control of leaf-eating insects in forests.

BRITTAIN (W. H.). **Some recent Experiments in the Control of the Cabbage Maggot** (*Chortophila brassicae*, **Bouché**).—*Jl. Econ. Ent.*, xvi, no. 1, pp. 61–68. Geneva, N.Y., February 1923.

The work of previous years for the control of *Phorbia* (*Chortophila*) *brassicae*, Bch. [*R.A.E.*, A, xi, 85, etc.] was continued on the same lines in 1922. Owing to the satisfactory results obtained with creosote oil used in a dust, tests were made with the main types of products entering into the composition of this material, the results of which show most of them to have a marked insecticidal or repellent value.

It cannot be definitely said whether the mercury bichloride (corrosive sublimate) treatment or the creosote dust actually destroys the eggs and larvae, but satisfactory results have been obtained by treating with mercury bichloride up to 14 days after the eggs have been laid, and with creosote up to 12 days. In the case of the latter, larvae up to 7 days old, or in the case of mercury bichloride, individuals up to 8 days old, are either destroyed or driven off. The efficiency of the treatment depends largely on the season, better results being obtained when the soil is moist.

GLASGOW (H.). **Control of the Root Maggot in Cabbage Seed-beds. (A Comparison of Methods).**—*Jl. Econ. Ent.*, xvi, no. 1, pp. 68–73. Geneva, N.Y., February 1923.

The usual method of protecting cabbage seed-beds from *Phorbia* (*Chortophila*) *brassicae* by means of cheesecloth screens in New York is rather expensive and involves a considerable amount of labour.

In comparing this method with the application of mercury bichloride, the latter proved cheaper and it has the further advantage of greater adaptability. Thus it was found that although three applications were necessary in 1921, two gave the same results in 1922. There is comparatively little danger in treating plants four days or even a week after they have come through the ground, but if they are treated too soon considerable scorching may occur. In the tests described the mercury bichloride was diluted at the rate of approximately 1–1,200 or 1 oz. to 10 U.S. gals. water. The average rate of application was about 1 U.S. gal. to 30 feet of row made with a watering-can from which the rose sprinkler had been removed. The unqualified substitution of this method for cheesecloth screens, however, cannot be recommended until further trials have been made.

WORTHLEY (H. N.). **The Squash Bug in Massachusetts.**—*Jl. Econ. Ent.*, xvi, no. 1, pp. 73–79, 2 figs. Geneva, N.Y., February 1923.

Anasa tristis, DeG. (squash bug) is locally abundant every year in Massachusetts but only causes serious damage occasionally. This generally occurs when the overwintering adults are abundant in the spring. There is only one generation a year in Massachusetts, a brief account being given of the seasonal history as occurring in that State. No satisfactory measure has yet been found against this pest, though of the substances tried nicotine sulphate dust would appear to give the most promising results.

The Tachinid, *Trichopoda pennipes*, F., has two generations a year in Massachusetts and as many as 80 per cent. of the adults of *A. tristis* that have hibernated have been found bearing eggs of this parasite. The adults of the second generation lay their eggs on the older nymphs and adults, and the resulting larvae pass the winter within the body of the host. All individuals parasitised by this generation succumbed before the oviposition period of the following spring. This parasite would appear to be of considerable practical importance in the reduction of the numbers of *A. tristis* in Massachusetts.

GLENN (P. A.). **The Onion Capsid, *Orthotylus translucens*, Tucker.**—*Jl. Econ. Ent.*, xvi, no. 1, pp. 79–81, 1 plate. Geneva, N.Y., February 1923.

Orthotylus translucens, Tucker, was first recorded from Illinois in 1915. The chief food-plant is wild garlic. The eggs are laid in longitudinal slits made in the fruiting stalks of the plant. About 20 are laid in each. The winter is passed in the egg stage, hatching continues throughout April, and the adults appear about the beginning of May. Eggs are laid from the middle of May until the adults disappear about the 10th June. The majority of the eggs are laid on garlic, though occasionally a few have been found in tops of cultivated onions. When the adults occur in large numbers, they fly to cultivated onions from the garlic fields, and their feeding causes the tops of the plants to wilt and die, thus stunting the growth of the onion.

Both adults and nymphs may be killed with whale oil soap, 1 oz. to 1 U.S. gal. water. The Capsids were practically absent from garlic fields that had been burned over or ploughed under during the previous autumn.

CORY (E. N.). **Dusting for the Pea Aphis.**—*Jl. Econ. Ent.*, xvi, no. 1, pp. 81–84. Geneva, N.Y., February 1923.

Of all the materials tested for the control of the pea aphis [*Acyrthosiphon pisi*, Kalt.] only nicotine can be relied upon to give satisfactory results. Tests with various combinations are recorded in tables, and the results have been supported by demonstrations on a commercial scale. High nicotine content is preferable to low content, and not less than 30 lb. of nicotine dust should be used to the acre. Dusting should be done in calm weather, good results being obtained at temperatures about 70° F. The maximum effect may be obtained by the use of a trailer of canvas.

SASSCER (E. R.) & WEIGEL (C. A.). **Further Data on Fumigation with Hydrocyanic Acid Gas in Greenhouses on a commercial Basis.**—*Jl. Econ. Ent.*, xvi, no. 1, pp. 84–87. Geneva, N.Y., February 1923.

Some of this information on fumigation with hydrocyanic acid gas has already been noticed [*R.A.E.*, A, x, 480]. Further experiments show that greenhouses containing the fern *Nephrolepis bostoniensis* may be successfully fumigated with 1 oz. of sodium cyanide per 1,000 cu. ft. of space with an exposure of one hour. The actual fumigation discussed was carried out between 7 and 8 o'clock at night at temperatures of 68° F. for the dry bulb and 66° F. for the wet bulb, with a humidity of 89 per cent. In this instance 99 per cent. of *Hemichionaspis aspidistrae*, Sign. (fern scale) and 80 per cent. of *Saissetia hemisphaerica*, Targ., were destroyed.

The greenhouse also contained *Nephrolepis* spp. and *Asparagus* spp., all of which were severely scorched.

The same concentration was effective against *Pseudaonidia duplex*, Ckll. (camphor scale) at temperatures ranging from 45° F. to 70° F., whereas at temperatures above this ¾ oz. proved sufficient.

The concentration of 1 oz. to 1,000 cu. ft. has been successfully applied to palms, *Citrus*, *Ficus* and camphor infested with *Chrysomphalus aonidum*, L. (Florida red scale) at a temperature of 78° F. and a humidity of 87 per cent. Two exposures at the same rate destroyed 83 per cent. of *Saissetia nigra*, Nietn., *Chrysomphalus dictyospermi*, Morg., *Pseudococcus nipae*, Mask., and *Cerataphis lataniae*, Boisd.; and 98 per cent. of *Parlatoria theae viridis*, Ckll., on *Aucuba japonica*. The various plants fumigated showed a decided stimulation of growth.

DELONG (D. M.). **Results of Spraying and Dusting for the Control of the Red Spider** (*Paratetranchyus pilosus*).—*Jl. Econ. Ent.*, xvi, no. 1, pp. 88–90. Geneva, N.Y., February 1923.

Paratetranychus pilosus has been causing serious damage in New York State, particularly to the foliage of prunes. In the case of trees with heavy crops the premature dropping of fruit was also noticed.

The life-cycle from egg to adult lasts 2–3 weeks, the generations overlapping to such an extent that eggs and adults were always present. The exact number of generations could not be ascertained.

Various combinations of sulphur dust have been tried, all of which destroyed from 50 to 60 per cent. of the insects. The addition of nicotine, lead arsenate, or lime and lead arsenate did not apparently increase the efficacy. Good results were obtained with a spray of lime-sulphur alone at the rate of 1 to 65 and 1 to 75, its efficacy being

increased by the addition of resin fish-oil or laundry soap at the rate of 1 lb. to 50 U.S. gals.

A better mixture is that recommended by T. D. Urbahns, consisting of a 1 per cent. lime-sulphur solution to which sulphur paste is added at the rate of 6 lb. to each 100 U.S. gals.; 1 lb. of resin fish-oil soap in place of the paste spreader increased the efficiency of the spray. Although it might be quite possible to control red spider with lime-sulphur alone at the rate of 1 to 40, this strength cannot be safely used on prune foliage. Scorching of the foliage apparently depends on the degree of humidity of the air and the consequent slow drying of the spray; thus under some conditions a solution of 1 to 50 was safely used, whereas under others 1 to 75 caused conspicuous scorching.

PARROTT (P. J.) & GLASGOW (H.). **The Insecticidal Properties of Tobacco Dust.**—*Jl. Econ. Ent.*, xvi, no. 1, pp. 90–95. Geneva, N.Y., February 1923.

In the experiments described the tobacco dust used was guaranteed to contain 1 per cent. of nicotine. Regrinding improved its physical properties, but even then it was difficult to maintain a uniform discharge of the spray owing to clogging of the suction strainer and unseating of the ball valves.

On the average its insecticidal properties are not as high as those of dust mixtures containing nicotine sulphate, and considering the present prices of commercial brands of tobacco extracts and tobacco dust in relation to nicotine content, the concentrated solutions are apparently more economical than powdered tobacco.

The fine tobacco dust showed a high rate of toxicity against some Aphids and the apple red-bug [*Heterocordylus malinus*, Reut.].

The rosy aphis [*Anuraphis roseus*, Baker] was effectively combated with either nicotine sulphate or tobacco dust incorporated in lime-sulphur or sulphur-glue sprays.

WAKELAND (C.). **Practical Control of** *Eleodes hispilabris* **over an extensive Area.**—*Jl. Econ. Ent.*, xvi, no. 1, p. 96. Geneva, N.Y., February 1923.

The experiments of 1921 for the control of *Eleodes hispilabris* in Idaho have been repeated in 1922 on a larger scale with equal success [*R.A.E.*, A, x, 310]. The poison bait consisted of bran, Paris green, amyl acetate and water distributed over the bottom of furrows ploughed at regular intervals.

STEAR (J. R.). **Introduced Mite attacking Willow.**—*Jl. Econ. Ent.*, xvi, no. 1, p. 96. Geneva, N.Y., February 1923.

Schizotetranychus schizopus, Zacher, occurred on *Salix alba* in Pennsylvania during 1922 in great abundance. This species has previously been recorded only from Germany, and it is of interest to note that *S. alba* is an introduced species of willow.

SEVERIN (H. H. P.). **"Fire Ant" injurious to Potatoes in California.**—*Jl. Econ. Ent.*, xvi, no. 1, pp. 96–97. Geneva, N.Y., February 1923.

Solenopsis geminata, F., subsp. *maniosa*, Wheeler, is recorded as destroying potatoes. The ants were tunnelling in the stalks in April 1919, and in all probability the potatoes had been planted in the nesting grounds of the ants.

PETTIT (R. H.). **A Repellent for Flat-headed Borers.**—*Jl. Econ. Ent.*, xvi, no. 1, pp. 97–98. Geneva, N.Y., February 1923.

Trees may be protected from flat-headed borers [*Chrysobothris* spp.] by the application of a mixture of 50 lb. laundry soap, 3 U.S. gals. water, 25 lb. flake naphthaline and 2 lb. flour.

Potash soap should be used in preference to soda soap so as to make a smooth mixture; it should be allowed to soften for a few days and then cooked in a double boiler until it reaches 180° F. The flour and naphthaline are then added, bringing the whole up to the same temperature again, so that the naphthaline will have melted. The mixture should then be cooled as rapidly as possible to prevent the naphthaline crystallising. Whilst cooling it should be stirred occasionally and when cool may be stored in air-tight drums during the winter. For use it must be warmed and thinned slightly to the consistency of heavy cream. The applications were made with a brush every three weeks, beginning 1st June. In tests carried on for about four years no injury to the trees has been observed. It is possible that the interval between treatments might be extended and that the same treatment will protect various trees from other borers.

HUNGERFORD (H. B.). **A Parasite of the European Rose Slug Egg.**—*Jl. Econ. Ent.*, xvi, no. 1, pp. 98–99. Geneva, N.Y., February 1923.

Trichogramma minutum, Riley, was found parasiting *Eriocampoides* (*Caliroa*) *aethiops*, F., in Kansas in 1919, but has not been observed since. The method of emergence of the Chalcid from the parasitised egg is described. It has also been recorded as parasitising the eggs of another sawfly, *Pteronus* (*Pteronidea*) *ribesii*, and of various Lepidoptera.

MCCLENDON (S. E.). U.S. Bur. Ent. **Rice Weevil.**—*Jl. Econ. Ent.*, xvi, no. 1, p. 99. Geneva, N.Y., February 1923.

The holes made through the husks of maize by *Calandra* (*Sitophilus*) *oryzae* (rice weevil) appear to be made chiefly in storage, though an instance is now recorded in which a second generation of adults were observed cutting their way through husks in the field.

PLANK (H. K.). *Rhagoletis tabellaria*, **Fitch.**—*Jl. Econ. Ent.*, xvi, no. 1, p. 99. Geneva, N.Y., February 1923.

Rhagoletis tabellaria, Fitch, is recorded from western Washington from an apparently new food-plant, the western tall blueberry [*Vaccinium*]. Larvae taken in infested berries in August 1918 pupated in the insectary on 20th August, the adults emerging during the summer of 1919.

SIMONETTO (M.). **Emulsiones insecticidas y factores fisico-quimicos que concurren a su eficacia.** [Insecticide Emulsions and the Physico-chemical Factors that assist their Efficiency.]—*Rev. Agric. Com. y Trabajo*, v, no. 2, pp. 5–8, 2 figs. Havana, April 1922. [Received 13th March 1923.]

In this theoretical paper the homogeneity, adhesiveness, coefficient of emulsification and wax-dissolving properties of spray solutions are discussed. Petroleum is satisfactory from these aspects. The quality of the soap—and in consequence the oils and fats—is also of marked importance.

S. C. B[RUNER]. **La mosca del mango (Notas entomológicas).** [The Mango Fly.]—*Rev. Agric. Com. y Trabajo*, v, no. 2, pp. 11–12, 1 fig. Havana, April 1922. [Received 13th March 1923.]

Brief notes on the various stages of the fruit-fly, *Anastrepha fraterculus*, Wied., and its habits are given from a report by B. T. Barreto, who has found that the variety of mango known as "manga blanca" is immune from infestation, so that there is no reason why the existing mango embargos in Florida should be maintained in the case of this variety exported from Cuba.

BARRETO (B. T.). **El "borer" de la caña de azucar.** [The Sugar-cane Borer.]—*Rev. Agric. Com. y Trabajo*, v, no. 2, pp. 17–18, 3 figs. Havana, April 1922. [Received 13th March 1923.]

This article on the sugar-cane borer, *Diatraea saccharalis*, F., its food-plants, natural enemies and control, contains no new information.

BALLOU (C. H.). **El aguacate como planta hospedera del adult de la mosca prieta.** [The Avocado Pear as a Food-plant of *Aleurocanthus woglumi*.]—*Rev. Agric. Com. y Trabajo*, v, no. 5, p. 16, 1 fig. Havana, 1922. [Received 13th March 1923.]

One of the measures adopted against *Aleurocanthus woglumi* is pruning, but the tender new leaves are soon infested by adult individuals that must have had some food-plant available in the meantime. The young leaves of the avocado pear are always more strongly infested than those of any other plant, and the pest increases very rapidly in places where avocados occur among coffee, orange, etc.

MONTANO (I.). **Modo de combatir la "mosca prieta"** [The Method of combating *Aleurocanthus woglumi*.]—*Rev. Agric. Com. y Trabajo*, v, no. 5, pp. 34–36. Havana, 1922. [Received 13th March 1923.]

If isolated trees are attacked by *Aleurocanthus woglumi* they must be sprayed with a kerosene-soap emulsion, one formula being yellow soap 2 lb., water 1 U.S. gal. and kerosene 1 U.S. gal. These trees and those near by must then be well pruned. In the case of infestations that are of old standing the use of a powerful spraying apparatus capable of reaching the less accessible parts of old trees is indispensable. This must be supplemented by light pruning of the weak branches in the centres of the trees.

WOLCOTT (G. N.). **Informe anual de la División de Entomologia para el año fiscal de 1921 a 1922.** [Annual Report of the Division of Entomology for the Financial Year 1921–1922.]—*Informe An. Estación Expt. Insular Rio Piedras, Puerto Rico, 1921–1922*, pp. 55–60. S. Juan, P.R., 1922. [Received 13th March 1923.]

In experiments with cyanide dissolved in water against mature larvae of *Lachnosterna vandinei*, Smyth, and *L. portoricensis*, Smyth, it was found that 100–200 lb. per acre was ineffective and that a dose of 500 lb. per acre killed only 70 per cent. In view of the fact that second stage larvae of *L. citri*, Smyth, were killed to the extent of 70 per cent. with 100 lb. per acre, further tests are being made with second stage larvae of the above species.

From 1912 to 1915 parasitic wasps, *Tiphia* spp., were introduced but disappeared. In 1921 some individuals very similar to the species introduced were taken, and there is a possibility that this may lead to an important natural control, though no parasitised larvae have yet been seen.

Experiments in the transmission of sugar-cane gummosis by larvae of *Diatraea saccharalis*, F., *Laphygma frugiperda*, S. & A., and *Cirphis latiuscula*, H. S., gave negative results.

The leaf-hopper, *Kolla similis*, Wlk., failed to transmit sugar-cane mosaic disease.

The study of coffee pests was continued. Among those found were a termite, *Lobitermes pubescens*, Snyder; two Gryllids, *Gryllacris* sp. and *Stenogryllus* sp.; a Pentatomid bug, *Edessa affinis*, Dallas; an undetermined Fulgorid; some hoppers, *Anthiante expansa*, Germ., *Monobelus fasciatus*, F., and others unidentified; a butterfly, *Letis mycerina*, F., the larva of which feeds on the leaves; a small Coccinellid, *Psorolyma maxillosa*, Sicard, and a larger species, *Daulis ferruginea*, Oliv.; and two ants, *Iridomyrmex melleus*, Wheeler, and *Macromischa isabella*, Wheeler, neither of which do important injury. The weevils, *Lachnopus coffeae*, Mshl., and its subspecies *montanus*, Mshl., may be destroyed with lead arsenate. The coffee leaf-miner, *Leucoptera coffeella*, Guér., abounds on the sides of roads and other exposed situations. Altitude and rainfall do not influence its occurrence. Perhaps the worst enemy of coffee in Porto Rico is an ant, *Myrmelachista ambigua ramulorum*, Wh., which tends mealybugs, etc., including *Cryptostigma ingae*, Ferris, found in its mines in *Inga vera* and *I. laurina*. Experiments are being continued to find a good poison-bait for this pest.

Heavy rains seem sufficient to prevent the tobacco leaf-miner, *Phthorimaea operculella*, Zell., from spreading from the dry districts of the island.

In 1921 the presence of the pink bollworm, *Platyedra* (*Gelechia*) *gossypiella*, Saund., and of the borer, *Cosmopolites sordidus*, Germ., was recorded in Porto Rico. The cotton leaf caterpillar, *Alabama argillacea*, Hb., which was an important pest two years before, has disappeared, *Anomis doctorium*, Dyar, being the only Lepidopterous pest of cotton foliage.

Chardon (C. E.). **Informe anual del patólogo especial para el año fiscal de 1921 a 1922.** [Annual Report of the Special Pathologist for the Financial Year 1921–1922.]—*Informe An. Estación Expt. Insular Rio Piedras, Puerto Rico, 1921–1922*, pp. 67–74. S. Juan, P.R., 1922. [Received 13th March 1923.]

In the course of a special study of the dissemination of the mosaic disease of sugar-cane, 40 experimental plots scattered throughout the cane districts were used. Rain proved to be an important factor, and prolonged rains are followed by a rapid spread of mosaic, whereas a period of drought checks its progress. The age of the cane influences infection, which ceases almost entirely after the fifth month after germination. It is significant that this arrest coincides with the stopping of weeding. Some varieties of cane differ in their susceptibility. Transmission in the field is mainly due to Aphids, the normal food-plants of which are various weeds. *Aphis maidis* is very common on *Eriochlos subglabra*, *Eleusine indica*, *Echinochlos colona*, *Syntherisma digitata*, and *S. sanguinale*, but *Carolinia cyperi* has only one food-plant, *Cyperus rotundus*. The abundance of these two species in the

Porto Rican cane-fields points to their being the vectors, and the indirect relation between weeds and mosaic is evident. Wind is a factor in establishing secondary foci of infection. The proximity of the sea to some fields reduces infection in them. It is possible that particles of salt are deposited on the leaves and repel the insect vectors, or that their usual food-plants do not flourish in sandy soil.

KNIGHT (H. H.). **A Fourth Paper on the Species of *Lopidea* (Heteroptera, Miridae).**—*Ent. News*, xxxiv, no. 3, pp. 65–72, 1 plate. Philadelphia, Pa., March 1923.

Among the new Capsids dealt with are *Lopidea lathyrae*, from U.S.A. and Canada, on *Lathyrus venosus*, which in some parts was found by the author to be so numerous that it is probably a potential pest of cultivated vetches, and *L. dakota*, from U.S.A. and Canada, reported to be injurious to small fruits.

ANDREWS (E. A.). **A Note on Crickets.**—*Qtrly. Jl. Indian Tea Assoc. 1922*, no. 3, pp. 112–114. Calcutta, 1922. [Received 15th March 1923.]

The chief damage from crickets in tea nurseries begins about March or April, when the insects are large enough to attack the older plants. By July they are becoming adult, and, having passed the period of growth, are not so voracious; moreover, the plants have grown too high and strong to be attacked. As soon as the adult stage is reached, kerosene emulsion might be used, pouring 1 part of the stock solution with 20 parts of water into the burrows to kill the adults before oviposition begins. The eggs can hardly be destroyed in this manner, since they are at the end of the burrow, which is turned upwards at the end. Poison bait would be useful if inserted into the burrows in the form of a plug; the young insects upon hatching would have to eat their way through this. In November or December, when the small heaps of fresh earth at the mouths of the burrows denote the presence of young crickets, the land should be hoed and then spread with a poison bait made of 25 lb. of husks of rice or any chopped green stuff, 2 lb. powdered lead arsenate (or, failing that, 5 lb. powdered copper sulphate), 6 finely chopped lemons (or 12 drops lemon essence) and 6 lb. gur, with 4 gals. water. The gur and water should first be mixed, then the lemons, lastly the poison, and the mixture then poured on to the green basis.

MARCHAL (P.). **Le Pyrèthre de Dalmatie et sa culture en France.**—*C.R. Acad. Agric. France*, ix, no. 3, pp. 85–93. Paris, 1923.

The growth of the use of pyrethrum as an insecticide is reviewed, and the method of its introduction into France for the purpose of industrial cultivation is described. It is thought that by selecting suitable soil, and by protecting against excessive humidity, the production of this useful insecticide can be increased with great advantage under the conditions obtaining in France.

BERNES (—). **Lutte contre les sauterelles et les criquets dans le Var.**—*C.R. Acad. Agric. France*, ix, no. 11, pp. 346–348. Paris, 1923.

In view of the serious damage done by various Orthoptera, including *Barbitistes fischeri*, Yers. (*berenguieri*, May.), in the Var region in 1922,

it is necessary to be prepared in time for the expected invasions in 1923. The usual preventive and remedial measures to be undertaken are explained.

CHEVALIER (J.). **Le Pyrèthre insecticide, ses préparations, son activité.** *C.R. Acad. Agric. France*, ix, no. 10, pp. 323–326. Paris, 1923.

French pyrethrum powder having now become an industrial product, its toxic and insecticidal properties have been compared with that obtained from Dalmatian plants. Tests have up to the present been made by spraying on flies and the larvae of the vine moths [*Clysia ambiguella* and *Polychrosis botrana*]. The results, although conclusive, could only be arrived at during a short period of the year, and did not prove the active value of the raw material used. An analysis was therefore made of the active properties of the plant; this is described, and showed that the stems and leaves have the same constituents as the flowers, but in a less degree. Experiments were then made on cold-blooded animals, and by the effects on them the author was able to estimate the relative power of pyrethrum flowers gathered under various conditions of soil and climate and with and without the addition of manures, and to test the value of the different methods of extraction and of the various French and foreign brands of pyrethrum offered for sale. The results showed that pyrethrum flowers, grown in France, properly gathered and dried, yield a powder that is equal to, if not better than, that obtained from Dalmatia. Flowers grown in very chalky, dry soil have more active properties than those from clayey, silicious land. The indications are that the action is increased by the addition of superphosphate and manganese to the soil.

The extraction of the active principles can be effected by the use of various volatile solvents, the best of which is petrol, but its use is dangerous. Extraction is a lengthy process and is often incompletely accomplished; for this reason the insecticides should be prepared in specialised factories. Prolonged heat should be avoided to preserve the acid reaction of the plant. Among the commercial preparations it was observed that the active properties of those with an alkaline reaction decreased rapidly, and frequently almost disappeared within a year. Soapy solutions have been advocated; these should be neutral or slightly alkaline. Preparations with a basis of sodium oleate and saponins are equally effective.

FEYTAUD (J.). **[The Campaign against** *Leptinotarsa decemlineata* **in France.]**—*C.R. Acad. Agric. France*, ix, nos. 2, 8, 9, 11, pp. 77–79, 271–274, 292–300 & 336–340. Paris, 1923.

The four main measures against *Leptinotarsa decemlineata*, Say, in France are discussed. These are the use of lead arsenate sprays [*R.A.E.*, A., xi, 210], hand-collection, which should be practised systematically on some such lines as are described [see also *R.A.E.*, A, xi, 186], the use of flame-throwers for burning over the foliage (this, however, is an expensive method and can only be employed in the midst of large areas of infestation owing to the danger to neighbouring crops and trees), and injections of poison into the soil. Carbon bisulphide is the best for this purpose, using about 88 gals. or rather less to the acre, poured into holes 4 in. deep at intervals of 10 in. In light soil, where the pest is most commonly found in Gironde, all nymphs and adults are killed within 48 hours, including any other

insects present in the soil. Treatment with chloropicrin gives similar results, but benzol is more expensive. In cases of sporadic infestation, treatment should be given for about five yards round each plant or group of plants attacked, but if the infestation is general or has persisted for 3 or 4 weeks, thorough extermination must be aimed at, even at the sacrifice of the crop. When treatment is made after the crop is ripe, the potatoes can be pulled up for use before the disinfection of the soil begins. It is essential that thorough inspection should be maintained, so that infestation may be discovered as soon as it begins, and treatment must be undertaken immediately. A general plan of defence against the pest is drawn up and summarised in the form of a schedule.

FEYTAUD (J.). **Un plan de lutte contre le Doryphore de la Pomme de terre.**—*C.R. Hebdom. Acad. Sci.*, clxxvi, no. 11, pp. 774–777. Paris, 1923.

This paper is a reprint of part of the previous one.

LE MOULT (L.). **La destruction des Insectes nuisibles par les Parasites végétaux.**—*Rev. Bot. app. & Agric. colon.*, iii, no. 18, pp. 81–102. Paris, 28th February 1923.

The results of the author's studies during the last 30 years in connection with the fungous parasites of insect pests are reviewed [*R.A.E.*, A, x, 603], and the method employed in cultivating the fungi in question is explained. The practical use of fungi against insect pests of various categories is discussed, both from the author's experience and that of other workers. It is pointed out that this method is of little use unless it is practised on a large scale, and the example of the United States is quoted as that of a country that expends vast sums for the destruction of insect pests and is amply compensated by the results.

Quelques ennemis du Cacaoyer dans l'Ouest africain.—*Rev. Bot. app. & Agric. colon.*, iii, no. 18, pp. 117–120. Paris, 28th February 1923.

This is a review of Ghesquière's recent work in the Belgian Congo on the pests and diseases of cacao, which has been noticed from other sources [*R.A.E.*, A, x, 284; xi, 147, 148.]

FLORES (J. L.) & CODERQUE (F.). **Estudios sobre el "** *Coccobacillus acridiorum* **" de d'Hérelle.** [Studies on *C. acridiorum*, d'Hérelle.] —*Bol. Agric. Téc. y Econ.*, xv, no. 170, pp. 176–179. Madrid, 28th February 1923.

The pathogenicity of *Coccobacillus acridiorum* is low when taken by the mouth and high when injected. The infection of baits for locusts with this organism has therefore the disadvantage of being slow in its action and of requiring large quantities.

BRÈTHES (J.). **La polilla del repollo** (*Plutella maculipennis*, **Curt.).** [The Cabbage Moth, *P. maculipennis*.]—*An. Soc. Rural Argentina*, lvii, no. 4, pp. 162–166, 3 figs. Buenos Aires, 15th February 1923.

A brief description is given of the various stages of the cabbage moth, *Plutella maculipennis*, Curt., which appears to have 3 or sometimes even 4 generations a year in Argentina, the eggs being laid before winter and hatching in spring. In summer the life-cycle requires about a month. Its natural enemies should be protected, and

a new parasite, *Limnerium leontiniae*, is described, this being the first of this genus of Ichneumonids to be found in Argentina.

For spraying, a petroleum-soap emulsion is recommended. To prepare this 2½ lb. of soap is dissolved in 1 gal. boiling water, and after this solution has cooled to about 65° F. it is well mixed with 10 gals. petroleum. This stock solution is diluted for use with water so that the spray contains 1–1½ per cent. of petroleum.

PETTIT (R. H.). **The Grape-berry Moth in 1922.**—*Michigan Agric. Expt. Sta.*, Circ. 52, 4 pp., 4 figs. East Lansing, Mich., December 1922. [Received 20th March 1923.]

During the summer of 1922 the grape-berry moth [*Polychrosis viteana*, Clem.] was more destructive in Michigan than ever before. Hibernation occurs in the cocoon, and the adults of the first spring brood appear as early as 3rd June and continue to emerge till after 1st August. Eggs are deposited 4 days after emergence and hatch in 4 days. Overlapping this spring brood there is a second, summer brood of moths that emerges from 1st August till the middle of September; a third, autumn brood, begins to produce larvae about the end of August and eggs continue to hatch till the middle of September. In 1922 in East Lansing the season was abnormally early. It seems reasonable to spray just before the buds open and again when the fruit is set and all the petals have fallen. As eggs are laid between the berries in the centre of the cluster, the spray should be applied while it is still possible to reach the inside of each cluster. All spraying should be done from below, and the leaves need not be sprayed. The cover-crop should be ploughed early, if possible in April, as hibernation probably takes place in the ground. All brush and rubbish near by should be cleared up, and an extra spray might be applied in the case of vines in the vicinity of woods or brush. As an adhesive, 1 lb. resin fish-oil soap should be used to a barrel of mixture, such as 1½ lb. lead arsenate to a barrel of Bordeaux. About 300 U.S. gals. should be applied to the acre in later sprays. The best results were obtained when spraying was applied by hand nozzles on short rods.

HERRICK (G. W.) & HADLEY, jr. (C. H.). **The Clover-leaf Weevil, *Hypera punctata*, Fab.**—*Cornell Univ. Agric. Expt. Sta.*, Bull. 411, 12 pp., 2 plates, 3 figs, 1 table. Ithaca, N.Y., July 1922. [Received 20th March 1923.]

The bulk of this information on the bionomics and control of *Hypera punctata*, F., has already been noticed [*R.A.E.*, A, ix, 312]. If the infestation is deemed serious enough and the value of the crop justifies it, spraying early in May when the larvae are active may be advisable. The best poison would be lead arsenate, using 8 lb. of paste or 4 lb. powder to 100 U.S. gals. water, adding 5 lb. soap to make the solution adhesive, but 3 lb. powdered calcium arsenate to 100 U.S. gals. water would be cheaper and probably more effective, and there would not be much danger of serious scorching of the plants.

HERRICK (G. W.) & COLMAN (W.). **The Cabbage Maggot, with special Reference to its Control.**—*Cornell Univ. Agric. Expt. Sta.*, Bull. 413, 15 pp., 8 figs. Ithaca, N.Y., December 1922. [Received 20th March 1923.]

The history and economic importance of *Phorbia* (*Chortophila*) *brassicae*, Bch., are recorded together with notes on its life-history.

At Ithaca in 1922 the first males were taken on the 3rd May and the first females on the 10th May, and most of the eggs were laid between the 15th and 20th May. The flies of the second brood emerged from 20th June to 17th July, and the first eggs were found in the field on the 2nd July. The experiments carried out in 1921 and 1922 with corrosive sublimate for the control of this fly on radishes and cabbages are described. No serious injury was caused to radishes by an application of 1 oz. to 8 U.S. gals. or of 1 oz. to 10 U S. gals. and either strength gives satisfactory control, even in severe infestations, if applied once a week during the growing period, the first application being made as soon as the plants have come well through the ground. Applications should be made below the leaves and against the stems as much as possible. Early cabbages may be protected by treatments at weekly intervals, the first being made within 3 or 4 days after the plants have been planted out in the field. There seems little difference between the two strengths, though 1 oz. to 8 U.S. gals. is recommended where the infestation has been severe. At least two applications should be made. Late cabbage plants in the seed bed may be protected by weekly applications during the growing period, but the data obtained are not sufficient to serve as a basis for definite recommendations. Notes on the methods of application are given.

THOMPSON (W. R.) U.S. Bur. Ent. & THOMPSON (M.C.). *Masicera senilis*, **a Parasite of the European Corn Borer** (*Pyrausta nubilalis*). —*Proc. Ent. Soc. Wash.*, xxv, no. 2, pp. 33–44, 3 plates. Washington, D.C., February 1923.

The systematic history of *Masicera* (*Paraphorocera*) *senilis*, Mg., is recorded, and a description of the adult and larval stages is given. At least three larval types of *M. senilis* exist [*R.A.E.*, A, x, 354]. *M. myoidea*, R.-D., of which *Andrina radicis*, Towns., is a synonym, is probably taxonomically identical with *M. senilis*, although biologically the two forms may be distinct.

Like *Zenillia roseanae*, B. & B., *M. senilis* has two generations a year in south-western France, in both of which the larval stage is passed in the larva of *Pyrausta nubilalis*, Hb. (European corn borer). The oviposition of this fly has not yet been observed, and it is thought that the larvae are deposited directly on the body of the host caterpillar. After it has finished feeding, the larva emerges and pupates in the gallery beside the remains of the host, but sometimes puparia have been found within the skin of the caterpillar. Hibernation is passed in the second larval stage in the hibernating host larva. In 1919 the first puparium was obtained on 9th April and in 1920 on 30th July. At Mentone on 29th July 1920 living larvae in all stages were found in the summer caterpillars. The development of the parasite in southern Italy appears to differ from that in south-western France. Dead caterpillars containing full-fed larvae and fresh puparia were recorded from Italy as early as 25th January. On 28th January two males emerged from these and adults continued to appear up to the time of writing, about 10th March.

The parasite has been found in larvae of *P. nubilalis* from south-western France, the French Riviera, the Maritime Alps and near Naples. It has not been found in material received from south Germany nor in caterpillars infesting *Artemisia* round Brussels, although a Tachinid heretofore considered to belong to the same species—though differing by certain characters both in the larval and adult stages—is known to occur in the north.

In south-western France this Tachinid is of little importance at present as a parasite of *P. nubilalis*, the average parasitism in 1919–20 amounting to 1·35 per cent. and in 1920 only to 0·9 per cent. It is thus less important in this region than *Z. roseanae.* On the Riviera, however, the parasitism was about 20·8 per cent in 1920–21. It would therefore appear to be an important factor in natural control only in the warmer regions of southern Europe.

CUSHMAN (R. A.). **A new Subfamily of Braconidae (Hym.) from Termite Nests.**—*Proc. Ent. Soc. Wash.*, xxv, no. 2, pp. 54–55, 1 plate. Washington, D.C., February 1923.

A new subfamily, YPSISTOCERINAE, is erected for *Ypsistocerus manni*, gen. et sp. n., taken from nests of *Nasutitermes ephratae*, Holmgren, and *Y. vestigialis*, sp. n., from nests of *N. cornigera*, Mots., both from Bolivia.

LEEFMANS (S.). **De Koffiebessenboeboek** (*Stephanoderes hampei*, **Ferrari** = *coffeae*, **Hagedorn**). **I. Levenswijze en oecologie.** [The Coffee Berry Borer, *S. hampei.* I. Life-history and Ecology.]—*Meded. Inst. Plantenziekten*, no. 57, 94 pp. Buitenzorg, 1923. (With a Summary in English).

The author's investigations into the coffee berry borer, *Stephanoderes hampei*, Ferr., were made in 1919, 1920 and 1921. Biological data only are given here; the results of experiments, lasting three years, to control this pest will appear later. For descriptions of the various stages, geographical distribution, synonymy and taxonymy Roepke's paper [*R.A.E.*, A, viii, 447] should be consulted.

The duration of the different stages of 30 individuals appeared to be: Egg, 6–7 days; larva, 10–21, and pupa, 4–8. The length of the life-cycle thus varied from 20 to 36 days, with an average of 25. The larva feeds on the tissue of the coffee bean—and not on a fungus growing thereon as stated by van de Weele [*loc. cit.*]. The green discoloration of the exposed bean tissue is due, according to Dr. H. Gorter, to chlorogen acid in the beans. There is an inactive prepupal period of 1–2 days. Counts between September and January of 28,426 beetles showed that only 2·5 per cent. were males. An examination of 300 males in different localities showed that their wings are too much reduced to permit flight. In experiments with 172 females no fertile eggs were laid in the absence of males. The percentage of males was lowest in green, higher in ripe and still higher in black berries. As 90 per cent. of the females from green and black berries are fertilised, it is evident that they mate before leaving the berries. The males do not leave the berries, or only rarely. It is therefore not possible to prevent mating. The maximum life of a female taken from a black berry was 102 days (3½ months), the maximum number of fertile eggs in captivity was 56, and the maximum period of oviposition 2½–3 months. The females began ovipositing 8–20 days after emergence. They often leave the berries about 4 p.m., being on the wing normally between 4 and 6 p.m. The longest flight distance ascertained experimentally was 378 yards. Light-traps are not attractive. Tanglefoot is no protection. No males were ever caught by tanglefoot. Passive distribution plays an important part in the spread of this pest, which seems to have been introduced into West Java about 1909 in infested coffee seed from Central and East Africa, where its original home is. Coffee seed, coffee bags and the clothes of workers are the media of distribution. The pest is also spread in the excreta of *Paradoxurus*

hermaphroditus [*R.A.E.*, A, x, 566]. No birds are known to eat the berries, so they cannot be distributors of importance.

So long as the coffee seeds are soft the females cannot breed in them, but travel from one unripe berry to another. This causes much harm as the contents of the unripe bored berries often decay. Green berries that had fallen but were not bored yielded 46·5 per cent. of decayed beans in one instance as compared with 80 per cent. in similar berries that had been bored by the beetle. If very young berries are attacked, they drop or rot, and considerable loss is thus caused. The hardness of the seeds is the factor that determines the possibility of breeding. Measurements, taken from the setting of the fruit to maturity, compared with numerous counts of berries made it possible to determine when the seeds hardened and when consequently supervision and measures were needed. With Liberia coffee the age is about 5 months, with Liberia–Arabica hybrid about 3–4 months, with Robusta about 3½ months and with Excelsa about 4 months. Beetles, eggs, larvae and pupae can be found in large numbers in black berries, which are most dangerous as breeding places. The infested ripe berries soon turn black, and only a part of the females leave them, the others remaining and breeding until the supply of food is exhausted. In one case 164 beetles were bred from a single coffee bean. Breeding continues in infested berries that fall, while fallen non-infested berries become infested on the ground.

A number of tests as to susceptibility to infestation were made with various kinds of coffee. While low infestation figures are of a temporary nature and no variety of coffee seemed absolutely immune, further investigations are desirable. In the literature the seeds of *Hibiscus*, Leguminosae and *Rubus* are mentioned as food. In Java the berries of *Vitis lanceolaria, Ligustrum pubinerve* and of the so-called Schumannia coffee have been reported as being bored into, but there is no proof that *S. hampei* breeds in them. Caution is necessary, as Scolytids very similar to *S. hampei* (such as *Coccotrypes perditor*, Blfd., from the seeds of *Pritchardia* sp., and *Xyleborus pygmaeus*, Eichh., from *Elaeis* nuts) are common. It may be concluded that hitherto *S. hampei* has been found breeding only in fresh coffee seeds; no living beetles have been found in dry market coffee. Their occasional occurrence in dry wood and in coffee twigs is accidental.

Natural enemies include swallows, which catch the swarming beetles, a parasite noticed in Uganda [*R.A.E.*, A, xi, 32, 171] and a fungus that attacks the adults but is of no practical importance. In 1921 and 1922 the last named occurred in abundance [A, xi, 169]. Experiments with the ant, *Dolichoderus bituberculatus*, show that berries from ant-infested bushes are less attacked. This was more than counterbalanced by the harm done by the green scale, *Coccus* (*Lecanium*) *viridis*, tended by the ants on the stalks of the young berries, resulting in 25 per cent. less berries and 1·4 per cent. more fallen berries. Other experiments showed that 29·7 per cent. of scale-infested berries fell as against 13·1 per cent. of berries free from scale.

Friederichs (K.) & Bally (W.). **Over de parasitische schimmels, die den Koffiebessenboeboek dooden.** [On the Parasitic Fungi that kill the Coffee Berry Borer.]—*Meded. Koffiebessenboeboek-Fonds*, no. 6, pp. 103–147, 5 plates. Soerabaya, January 1923. (With a Summary in English).

This is the full report of which a résumé has already been noticed [*R.A.E.*, A, xi, 169].

HEGH (E.). **Les Termites.** [Chapt. v.]—*Bull. Agric. Congo Belge*, xiii, no. 3–4, pp. 499–605, 69 figs. Brussels, September–December 1922.

This section dealing, *inter alia*, with the natural enemies of termites, and their action on the soil and on vegetation is an instalment of a work the whole of which has been noticed separately [*R.A.E.*, A, x, 570].

POUTIERS (R.). **La Pyrale de Maïs et ses parasites.**—*Riviera scientifique*, ix, no. 1, pp. 1–5. Nice, 1922.

Effective parasites of the larvae of *Pyrausta nubilalis*, Hb., in the south of France are the Tachinids, *Masicera* (*Paraphorocera*) *senilis*, Rond., and *Zenillia roseanae*, B. & B.; an Ichneumonid, *Eulimneria crassifemur*, Th., which is common in the spring; and two Braconids, *Habrobracon brevicornis*, Wesm., abundant in autumn, and *Rhogas testaceus*, L. A Chalcid, *Trichogramma* (*Cophthora*) *semblidis*, Auriv., is parasitic on the eggs.

BRASCASSAT (M.). *Galeruca calmariensis*, **Fab.**—*Procès Verb. Soc. Lin. Bordeaux*, lxxiv, no. 1, pp. 38–39. Bordeaux, January–June 1922.

There was a considerable decrease in the numbers of *Galerucella luteola*, Müll. (*Galeruca calmariensis*, F.) on elms in the Bordeaux district in 1921, owing to the low temperature in the middle of May, which caused the destruction of numbers of larvae.

The winter treatment recommended is thorough painting with lime. In the spring the following wash should be applied: 2½ lb. sulphur, 5 lb. soot and 3½ lb. tobacco extract in 5 gals. water. The branches should be shaken over a cloth, which must be burned with its contents.

CHEVALIER (L.). **Observations sur** *Dinetus pictus*, **hymenoptère mangeur de Punaises, et sur son parasite naturel** *Anthomyia albescens*.—*Bull. Soc. sci. Seine-et-Oise*, ser. 2, iv, no. 1, pp. 12–14. Versailles, 1923.

The habits are recorded of the Sphegid, *Dinetus pictus*, F., a predacious enemy of Rhynchota and of *Anthomyia albescens*, a fly that oviposits on the prey in the nest of the wasp.

JACK (R. W.). **Insect Pests of Fruits other than Citrus in Southern Rhodesia.**—*Rhodesia Agric. Jl.*, xix, nos. 5 & 6, pp. 569–582, 664–674, 9 plates; xx, no. 1, pp. 59–72, 4 plates; also as *Rhodesia Dept. Agric.*, Bull. 450, 40 pp., 13 plates. Salisbury, October & December 1922 and February 1923.

The cultivation of fruits other than *Citrus* has not as yet assumed great importance in Southern Rhodesia, and they are not seriously attacked by insect pests. The fig is more subject to pests than others.

The fruit-piercing moths with a specially modified proboscis that have so far been recorded are: *Othreis materna*, L., *O. fullonica*, L., *O. divitiosa*, Wlk., *Calpe provocans*, Wlk., *C. triobliqua*, Saalm., *C. emarginata*, F., *Serrodes inara*, Cram., and *Pericyma umbrina*, Guen. Those with an unmodified proboscis are: *Anua tirhaca*, Cram., *Achaea catella*, Guen., *A. violascens*, Hmps., *A. lienardi*, Boisd., *A. echo*,

Wlk., *A. finita*, Guen., *A. sordida*, Wlk., *A. albicilia*, Butl., *A. trapezoides*, Guen., and *Sphingomorpha chlorea*, Cram. Notes are given on the bionomics and control of these moths together with a list of their food-plants.

Among the other pests dealt with are *Ceratitis capitata*, Wied. (Mediterranean fruit-fly), which is an introduced species. The eggs in summer hatch in 2–4 days. The ripeness of the fruit seems to have an influence on the time of hatching, and if it is too green the eggs may not hatch, or if they do, the larvae perish immediately. The larval stage usually lasts a fortnight to three weeks and the pupal stage in the soil from 12 to 21 days, depending on the season. The whole life-cycle at midsummer may last 28 days, and as much as 2 months or more in the winter. The females survive several months during the winter if no fruit is available for oviposition. The food-plants of this species are given. Two other species of fruit-flies attacking cultivated soft fruits are *Pardalaspis quinaria*, Bezzi (Rhodesian fruit-fly) and *P. cosyra*, Wlk.

Omophorus stomachosus, Boh. (fig weevil) is a well known South African pest and probably the commonest cause of stung figs. The eggs are inserted in cavities in the skin of the fruit and are apparently laid mainly in half developed fruits. They hatch in 3 days, and the larval stage lasts about 3 weeks, the pupal stage being passed in the fruit, which usually falls to the ground about this time, the adults emerging about 6 days later. It is probable that the weevil continues breeding throughout the year where fruit is available, but that the larval stage is prolonged in cold weather. In hot weather the whole life-cycle occupies less than a month, and it is possible that 4 or 5 broods may mature during the year. In any case the broods overlap very much as the season advances, so that all stages of the weevil are sometimes to be found in the figs at the same time. The adults not only feed on the fruit but gnaw the young bark of the twigs in the absence of fruit; they breed as freely in wild as in cultivated figs, but are not known to attack any other class of fruit. Infested fruit should be regularly collected and destroyed. The removal of wild fig trees, or the systematic destruction of their fruit, near cultivated trees is essential. During the summer the beetles may be shaken on to sheets spread below the trees. Possibly spraying with an arsenical compound might be beneficial. Heavy spraying with 1 lb. powdered lead arsenate to 30 gals. water early in September is worth a trial, and the addition of 6 lb. cheap sugar or 1 gal. molasses to each 10 gals. of liquid might make it more effective. In general it appears desirable to rely upon remedial measures other than spraying, which is mentioned for those who may wish to experiment.

A potential pest of some significance, which may have been confused with *O. stomachosus*, is *Polygrammodes hirtusalis*, Wlk. (fig Pyralid). A high percentage of wild figs are infested at Salisbury, but so far it has not yet been recorded on cultivated figs. Little is known of its life-history, but it has been bred out in numbers in September and November, whilst one adult was taken in January. Late in October 1922 the larvae were present in large numbers. A brief description is given of the adult and larva. When the latter is mature, it leaves the fruit and spins a cocoon in some convenient crevice, where it pupates, the adult emerging apparently within 2 or 3 weeks in the summer months. All infested fruit should be destroyed and wild figs in the vicinity eliminated. As the adults cannot be destroyed in the manner recommended for *O. stomachosus*, this Pyralid would

probably prove more difficult to check after infestation of the crop had commenced.

Brief notes are given on the bionomics and control of various other insects that eat the fruit and attack the foliage, trunk, branches and twigs. Some pests of fruit prevalent in the South African Union, but not yet recorded in Southern Rhodesia, are *Cydia pomonella*, L., *Aspidiotus perniciosus*, Comst., *Diaspis pentagona*, Targ., and *Coryphodema tristis*, Drury.

GRANDI (G.). **Diagnosi preliminari di Imenotteri dei fichi.** [Preliminary Descriptions of Hymenoptera from Figs.]—*Ann. Mus. Civico Storia Nat.*, Ser. 3, ix (xlix), pp. 304–316. Genoa, 1922. [Received 20th March 1923.]

Besides those already noticed [*R.A.E.*, A, x, 369], the species described are :—SYCOPHAGINAE : *Lipothymus sumatranus*, gen. et sp. n., from Sumatra. IDARNINAE : *Otitesella africana*, sp. n., from *Ficus vogelii*, in French Guinea ; *O. epicarioides*, sp. n., from Eritrea ; *Sycobiella monstruosa*, sp. n., from French Guinea ; and *Terastiazoon jacobsoni*, gen. et sp. n., from *Ficus garciniaefolia*, and *Micrognathophora leptoptera*, gen. et sp. n., from *Ficus acanthophylla* in Java.

HALLAUER (E. R.). **Verslag van de proeven ter bestrijding der Koffiebessen-boeboek met de Methode van Davelaar (Smeermethode).** [Report on the Experiments in combating the Coffee Berry Borer with the Van Davelaar (Smearing) Method.]—*Meded. Proefst. Midden-Java*, no. 38, pp. 1–41, 5 plates. Salatiga, 1923.

An account is given of experiments with smearing coffee berries with grease as suggested by van Davelaar [*R.A.E.*, A, x, 507, 602; xi, 169]. The conclusion reached is that this method is not sufficient in itself, but that it gives excellent results in conjunction with other measures, of which "rampassen" [*R.A.E.*, A, i, 57 ; x, 506] is the best example, but this measure should be of a partial character. At the end of harvest all ripe berries and black berries should be removed from the bushes and from the ground. The plucking should include half-ripe berries, *i.e.*, such as will be ready for plucking in 2 months time. Green berries should be left. The adhesive power of the mixture lasts about 2 months, and no application should be made 2 months before plucking.

Estates free from infestation should be kept clear of black and fallen berries.

This paper is followed by a number of circulars already noticed [*R.A.E.*, A, x, 551 *et sqq.*].

Os insectos damninhos. xxvi. O pulgão do cacaoeiro, *Toxoptera theobromae*, **Schout.** [Injurious Insects. xxvi. The Cacao Aphid, *T. theobromae*.]—*Chacaras e Quintaes*, xxvi, no. 6, pp. 460–461, 2 figs. S. Paulo, 15th December 1922. [Received 21st March 1923.]

These brief notes on *Toxoptera aurantii*, Boyer (*theobromae*, Schout.) are from data furnished by Mr. G. Bondar, who states that this Aphid occurs in Bahia on orange trees as well as on cacao. In many cases infestations may be ended by destroying the ants that protect the pest.

MOREIRA (C.). **Uma praga das ameixeiras.** [A Pest of Plum-trees.]—*Chacaras e Quintaes*, xxvi, no. 6, p. 479, 1 fig. S. Paulo, 15th December 1922. [Received 21st March 1923.]

Collection of the Melolonthid beetle, *Ceraspis modesta*, Burm., injuring the foliage of plum-trees is advised. As the eggs are laid in the ground it should be kept cultivated.

BOS (J.). **Az atkakór Magyarországon.** [Diseases of Grape-vines due to Mites in Hungary.]—*Kiserletügyi Közlemenyek*, xxiii, no. 1, pp. 1–41, 23 figs. Budapest, 1920. [Received 16th April 1923.]

Grape-vines are attacked by the mite, *Phyllocoptes vitis*, Nal., which lives on the lower surface of the leaves. The distribution of this mite in Switzerland, France, Austria and Dalmatia is given, and its bionomics are recorded. Hibernation takes place under the bark of branches more than two years old, and possibly in the buds themselves. The damage done is described; it has been observed in Hungary since 1914. Yellowish-white or colourless spots are seen on the leaves, which become wrinkled and curled at the edges. Development is very slow in the spring, and thick and short shoots appear from the end of the stem. The vines only bear small and diseased grapes, if any, and they mostly die at the end of July, though in wet weather they live longer.

The differences between *Phyllocoptes vitis*, Nal., and *Eriophyes (Phytopus) vitis*, Land., are described. Spraying in winter with lime-sulphur is recommended. An appendix gives a brief description of a natural enemy, probably a Tyroglyphid mite, and some notes on a species of *Tetranychus* that also occurs on grape-vines.

KADOCSA (Gy.). **Mezögazdasági Növényeink Fontosabb Állati Ellenségei.** [The more important Animal Enemies of our Agricultural Plants. Their Bionomics, Depredations and Control.]—186 pp. 43 figs. Budapest, 1923.

This small work is of a popular character. The insect pests are dealt with according to the crops attacked. Chapters are devoted to those injurious to all the cultivated plants, such as locusts, cockchafers, wireworms, cutworms, etc.; to pests of cereals, including *Lema melanopa*, *Cephus pygmaeus*, the European corn-borer [*Pyrausta nubilalis*] and the various flies injurious to grain; to pests infesting leguminous plants, such as *Sitona* and *Bruchus*; to pests of other crops, such as *Entomoscelis adonidis*, *Otiorrhynchus ligustici*, *Ceuthorrhynchus sulcicollis*, *C. macula-alba*, *Athalia colibri*, *Perrisia* (*Dasyneura*) *papaveris*, *Thrips communis*, *Hepialus humuli*, *Hypena rostralis*, *Phorodon humuli* and *Tetranychus telarius*; and to pests of stored grain.

Abstracts are given of the Hungarian laws respecting locusts and of the official regulations for the destruction of cockchafers [*Melolontha*] and sugar-beet beetles, *Bothynoderes* (*Cleonus*).

JABLONOWSKI (J.). **A közönséges paszuly-zsizsik.** [The Bean Bruchid in Hungary.]—*Köztelek*, xxx, nos. 9 & 10, pp. 138–139 & 158, 2 figs. Budapest, 28th February and 6th March 1920. [Received 16th April 1923.]

In 1919 beans in south-west Hungary were badly infested with *Bruchus obtectus*, Say. This Bruchid was introduced from America

about 40 years ago in *Phaseolus* sp., but was exterminated ; in 1919, however, it was again imported from Croatia (Jugo-Slavia). The importance of this introduction is discussed, and the bionomics and control of the Bruchid as practised in America are given. In 1919 another variety of bean heavily infested with *Spermophagus pectoralis*, Shp. (cowpea Bruchid) was imported from America, but as yet no adults have been observed.

JABLONOWSKI (J.). **Mikor kell védekezni a vetési bagolypille hernyója ellen?** [What is the best Time to control the Cutworms, *Euxoa segetum*, Schiff.?]—*Köztelek*, xxxi, no. 52, pp. 1185–1186, 2 graphs. Budapest, 14th December 1921. [Received 16th April 1923.]

Some observers state that the adults of the Noctuid, *Euxoa segetum*, Schiff., occur from May to August, or as late as September, while others have found pupae in April or May, the resulting adults being on the wing in June and July. In Hungary these cutworms are injurious to the winter seeds in autumn and in spring, and later attack cereals and sugar-beet till the middle of July.

Records collected for the last 40 years show that no damage is done from January to March, but the greatest injury is caused from April till the middle of July, with none in August, but beginning again in September, reaching its height in October and ceasing in November. This would appear to indicate that there are two generations, one in the spring and another in the autumn, but this is not so, as no pupae resulted in the winter or spring from the injurious larvae of the autumn.

The author considers that there is one generation a year, hatching in September and increasing till the end of October or early November, when the immature larvae hibernate. They become injurious again in April or May till June and early July, when they are mature.

Weeds should be destroyed all the year round, but particularly from July to September. If weeds are destroyed after eggs have been deposited on them, the larvae will remain in the soil and feed on the growing seed. All stubble should be ploughed immediately after harvest.

JABLONOWSKI (J.). **Méheink tavaszi pusztulását okozó gyomorvész, Nozemózisz, *Nosema apis*, Zand., és megakadályozásáról.** [A Disease due to *N. apis*, which is fatal to Bees in Spring.]—15 pp., 5 figs. Budapest, 1923.

In the spring of 1922 nosema disease caused a loss of from 20 to 80 per cent. of the wintered bees in Hungary. The differences between the various bee diseases are discussed. The causative organism, *Nosema apis*, Zand., is described The author emphasises the fact that infected bees cannot be cured, but gives various ways by which the disease may be prevented.

FRICKHINGER (H. W.). **Eine unerwünschte Einquartierung.** [An undesired Visitation.]—*Die Umschau*, xxv, 1921, pp. 47–49. (Abstract in *Neuheiten Gebiete Pflanzenschutzes*, 1922, no. 5–6, p. 8. Vienna, 1922.)

A marked increase of *Niptus hololeucus*, Fald., has been noticed in Bavaria, Würtemberg and Switzerland. In dwellings it does no direct damage, but is a great annoyance, sometimes rendering the

rooms uninhabitable. Much damage is done in chocolate factories and in wool and leather stores. Fumigation with hydrocyanic acid gas is the best remedy; other measures are the use of pyrethrum powder and trapping in cloths damped so as to attract the beetles.

SCHULZ (F. N.). **Ueber Farbstoff und Wachs der Blutlaus** (*Schizoneura lanigera*). [The Colouring Matter and Wax of the Woolly Aphis, *Eriosoma lanigerum*.]—*Biochem. Zietschr.*, cxxvii, 1922, pp. 112–119. (Abstract in *Neuheiten Gebiete Pflanzenschutzes*, 1922, no. 5–6, p. 10. Vienna, 1922.)

The chemical composition of the colour and wax secreted by *Eriosoma (Schizoneura) lanigerum*, Hsm , is the subject of this paper. The wax is a glycerine of a peculiar fatty acid and differs from that secreted by other insects.

SPEYER (W.). **Der Apfelblütenstecher.** [The Apple Blossom Weevil.] —*Biol. Reichsanst. Land- u. Forstwirt.*, Flugbl. 69, 4 pp., 3 figs. Berlin, February 1923.

A short account is given of *Anthonomus pomorum*, L., and the injury done by it, as a result of which the apple crop in Germany is appreciably reduced. The larvae can develop only in closed buds, and pears, the blossoms of which soon open, are therefore less infested. Other natural factors influencing the abundance of this weevil are Hymenopterous and fungous parasites, bacteria, birds and inclement winter weather. Growers should choose varieties that bud late but soon blossom. Jarring the weevils on to cloths spread beneath the trees, their capture in shelter-traps and the removal of infested buds are other useful measures. Poison-sprays may be used against the young weevils feeding at the surface, while many may be destroyed with winter treatment with a 10 per cent. solution of fruit-tree carbolineum.

SPEYER (W.). **Blutlausbekämpfung durch Auswahl geeigneter Apfelsorten.** [Woolly Aphis Control by Selection of suitable Apple Varieties.]—*Provinz. Monatschr. Obst-, Wein- u. Gartenbau*, xxiv, no. 3, pp. 40–41. Halle (Saale), March 1923.

Apples are infested by the woolly aphis [*Eriosoma lanigerum*] in varying degrees, some types being almost immune. In the Prussian province of Saxony the variety known as Northern Spy, which is universally immune from attack, is not grown. Lists are given of a number of locally grown varieties that are very resistant and of a number that are regularly, but not severely, attacked.

LÉCAILLON (A.). **Notes sur le Négril de la Luzerne** (*Colaspidema atra*, **Latr.) 2e Note. Plantes diverses pouvant plus ou moins servir d'aliment au Négril.**—*Rev. Zool. agric. & app.*, xxi, no. 12, pp. 189–194. Bordeaux, December 1922.

The food-plants recorded for *Colaspidema atrum*, besides cultivated lucerne, are sainfoin, wheat, clover, *Medicago murex*, *Vicia sativa*, various kinds of marguerites, and foliage of haricot beans, potatoes and parsley. All these, while serving as temporary food-plants, are not sufficient to replace cultivated lucerne for the maintenance of this beetle.

WILLIAMS (C. B.). **A New Type of Light Trap for Insects.**—*Minist. Agric. Egypt, Tech. & Sci. Serv.*, Bull. 28, 2 pp., 1 diagram, 1 plate. Cairo, 1923.

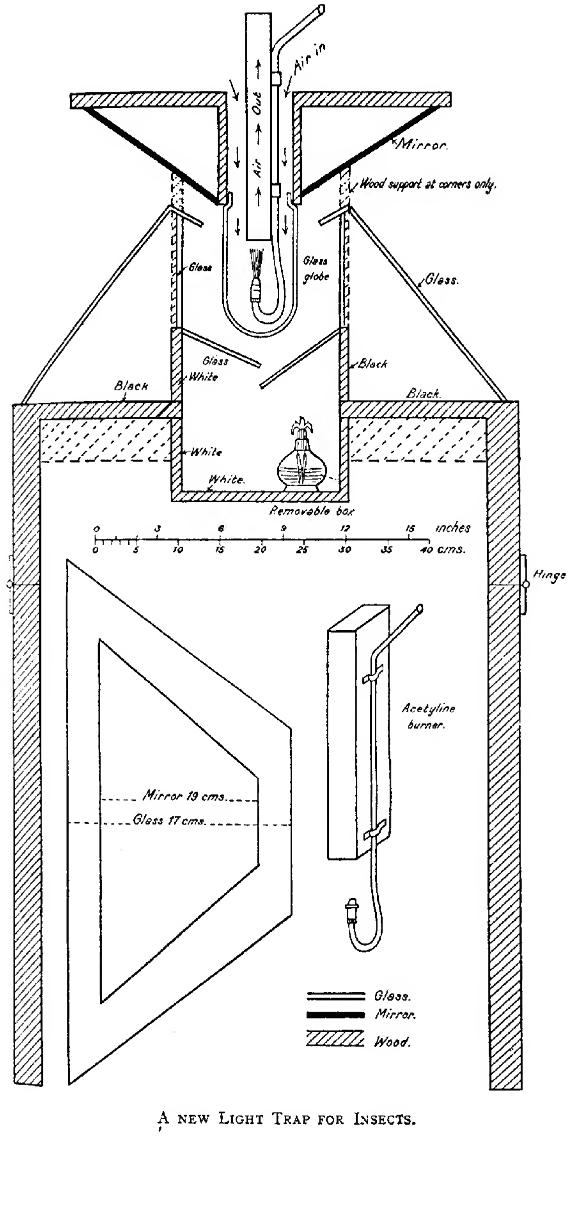
A suitable trap should be able to show light in all directions, should be available for electricity or acetylene without serious alteration, should enable insects to be killed or stupified soon after entering so as to be in a good condition for identification, and should afford little encouragement for them to settle on the outside of the trap. It should also be portable and capable of use by an untrained worker. A light trap for use in the field, which appears to fulfil all these requirements is described and illustrated. It stands about 3½ ft. high. In the removable box is kept a small spirit lamp or other container filled with carbon tetrachloride, which evaporates slowly from the wick. This was chosen as it is a fairly good killing agent, volatile, heavy and not inflammable or explosive. Carbon bisulphide could only be used with electricity, being too dangerous with acetylene. The light is in an inverted globe, closed completely beneath. If acetylene is used, the burner and chimney are necessary to set up a proper air circulation. When the trap is lighted, insects flutter up the sloping glass or down the sloping mirrors to the opening of the inner enclosure, which they enter between the globe and the small sloping glasses. They flutter for some minutes round the globe, but later slip or are attracted downwards to the lower chamber, which is white. Here they are overcome by the fumes of the poison and fall on to the floor of the removable box. These traps give the best results on a still night, as a high wind is apt to blow out the poison vapour ; but experience has shown that with a wind strong enough to affect the trap few insects come to it, so that this disadvantage is not serious.

BLANCHARD (E. E.). **Principales cochinillas de los citrus en Argentina. Primera parte : Cóccidos protegidos.** [The chief Coccids of *Citrus* in Argentina. First part : Protected Coccids.]—*Bol. Minist. Agric. Nacion*, xxvii, no. 3, pp. 387–398, 1 pl. Buenos Aires, July–September 1922. [Received 22nd March 1923.]

The species dealt with are : *Chrysomphalus dictyospermi*, Morg., *C. aonidum*, L., *Lepidosaphes beckii*, Newm., *Chionaspis citri*, Comst., and *Aspidiotus hederae*, Vall. In each case the distribution, food-plants and injury are noticed. *Chrysomphalus dictyospermi* occurs throughout the citrus zone in Argentina, with 3 or 4 generations a year. *C. aonidum* has probably 6 generations in the northern part but only 4 at the latitude of Buenos Aires. *L. beckii* has 2 or 3 generations at the latter latitude. *Chionaspis citri* occurs throughout the citrus zone in the north, especially in Corrientes, where it is a fairly important pest. *A. hederae* is found in nearly all the Argentine states.

Most of the natural enemies are insects. A Coccinellid beetle, *Coccidophilus citricola*, Brth., occurring almost everywhere in Argentina, is one of the most active checks on *L. beckii*, while a Hymenopteron, *Aspidiotiphagus citrinus*, How., is a common parasite of *A. hederae*. In damp areas fungi of the genera *Sphaerostilbe*, *Sporotrichum*, *Myriangium*, etc., help to prevent the increase of the pests.

Artificial measures include the destruction by fire of all prunings. Nursery plants are best dealt with by fumigation with hydrocyanic acid gas. Large trees should be sprayed with kerosene-soap, lime-sulphur, or Molina mixture To prepare the last-named, 4–5 gals.



A NEW LIGHT TRAP FOR INSECTS.

of water is brought to the boil and 1 lb. of yellow soap is dissolved in it, after which 6 lb. of flour, completely mixed in 12 lb. weight of cold water, is added. The paste is boiled and passed through a sieve of 1–2 mm. mesh and then $\frac{3}{10}$ gal. of kerosene and enough cold water to make up 10 gals. are added. This spray must be used the same day that it is prepared.

RIVEROS (E.). **Investigación viticola en la provincia de Catamarca.** [An Investigation into Viticulture in the Province of Catamarca, Argentina.]—*Bol. Minist. Agric. Nacion*, xxvii, no. 3, pp. 430–464, 9 figs. Buenos Aires, July–September 1922. [Received 22nd March 1923.]

The most important insect pests are locusts in the hopper stage. Others are *Pseudococcus vitis*, which is rare, *Eriophyes* (*Phytoptus*) *vitis*, which is seldom found on vines dusted with sulphur, and a Nematode, *Heterodera* (*Anguillula*) *radicicola*, Greef, found throughout the Province.

The vines are not grafted on American stocks, so that *Phylloxera* might do some harm, if introduced, though it would be restricted by the unsuitable soil and the system of irrigation by submersion.

NEWELL (W.). **Report of the Plant Commissioner for the Period from May 1, 1920 to June 30, 1922.**—*Qtrly. Bull. State Plant Bd. Florida*, vii, no. 2, pp. 75–143. Gainesville, Fla., January 1923.

The production and distribution of pure cultures of the fungus used against whiteflies has continued, and colonies of *Novius* (*Vedalia*) have been collected and distributed where required against the cottony cushion scale [*Icerya purchasi*]. The spread of the sweet potato weevil [*Cylas formicarius*] has been limited as a result of thorough application of quarantine measures. Stringent measures have been taken to eradicate bee diseases, and where American foulbrood has been discovered, the colonies have been destroyed. The latest rules and public notices issued by the Plant Board are briefly outlined.

An account is given of the work of the nursery inspection and quarantine departments, with detailed lists of the principal pests intercepted during the two years under review.

Report on Inspections and Interceptions, all Ports and Stations, for the Quarter ending December 31, 1922.—*Qtrly. Bull. State Plant Bd. Florida*, vii, no. 2, pp. 144–145. Gainesville, Fla., January 1923.

Two important pests intercepted during the quarter were black-fly [*Aleurocanthus woglumi*] on spice from the British West Indies, and West Indian fruit-fly [*Anastrepha fraterculus*] in guava from Cuba.

TOWER (W. V.). **Report of the Entomologist.**—*Rept. Porto Rico* [*Federal*] *Agric. Expt. Sta., Mayaguez, P.R., 1921*, pp. 23–26. Washington, D.C., September 1922. [Received 22nd March 1923.]

Experiments have been made to discover whether insects are responsible for the dissemination of the mottling disease of sugar-cane, which causes heavy losses in Porto Rico. The insects tested included *Sipha flava* (yellow plant-louse), which is very abundant in many fields and causes stunted growth to much of the cane, feeding also on many

other grasses, sorghum, corn, wheat and morning-glory [*Ipomoea*]; the common green corn aphis [*Aphis maidis*]; black thrips [*Haplothrips tenuipennis*]; springtails; and many leafhoppers, including *Kolla similis* (common green sugar-cane leafhopper), *Cicadella* (*Tettigonia*) *sirena*, *Oliarus cinereus*, and *Stenocranus* (*Delphax*) *saccharivorus*. None of these was found to be a carrier.

CHUNG (H. L.). **Report of the Agronomy Division.**—*Rept. Hawaii Agric. Expt. Sta., Honolulu, 1921*, pp. 26–35. Washington, D.C., 12th September 1922. [Received 22nd March 1923.]

The insect pests recorded during the year included *Peregrinus maidis* (maize leafhopper), which destroyed some of the new varieties of maize being tested; *Pieris* (*Pontia*) *rapae* (cabbage butterfly), which was heavily parasitised by the Tachinid, *Frontina archippivora*; *Bruchus chinensis* and *Calandra oryzae*, which were so numerous in maize and bean seed as to render monthly fumigation necessary; and *Perkinsiella saccharicida* (cane leafhopper), which was not specially numerous.

SMITH (H. S.). **[Report of] the Bureau of Pest Control [1922.]**—*Mthly. Bull. Cal. Dept. Agric.*, xi, no. 11–12, pp. 793–838, 16 figs. Sacramento, Cal., November–December 1922.

An account is given of the work of the Bureau during 1922, the insect pests dealt with including *Otiorrhynchus rugifrons* (strawberry root weevil), the work against which has been successfully continued [*R.A.E.*, A, x, 314]; yellow-striped armyworm [*Prodenia ornithogalli*] abundant in many localities; *Anarsia lineatella* (peach moth), against the early generation of which winter-strength lime-sulphur is effective when the applications are properly timed; and *Pseudococcus maritimus* (pear mealybug), against which miscible oil has been successfully used. The work in connection with codling moth [*Cydia pomonella*] in walnuts has been continued on the same lines [*loc. cit.*]. Considerable advance has been made in the treatment of nursery stock, particularly as regards vacuum fumigation [*R.A.E.*, A, xi, 51]. Improvements have been made in connection with the hot water treatment of grape cuttings to prevent the spread of *Phylloxera*.

The biological control of insects has included further distribution of *Aphycus lounsburyi*, for the control of the black scale [*Saissetia oleae*]. Secondary parasites, particularly *Quaylea whittieri* [*R.A.E.*, A, x, 70] are becoming important in retarding the work of *Aphycus*.

Pseudococcus gahani (citrophilus mealybug) is rapidly becoming more generally distributed in southern California. Some difficulty has been experienced in attempts to establish *Orcus chalybeus* (steel-blue ladybird), whilst *Chilocorus bivulnerus* (twice-stabbed ladybird) has been abundant throughout the south feeding on the red scale [*Chrysomphalus aurantii*]. Some success has been attained in the laboratory with *Rhizobius lophantae* against this scale. There has been an unusual demand for the distribution of *Novius cardinalis*, the numbers of this enemy of the cottony cushion scale [*Icerya purchasi*] probably having diminished as a result of feeding on eggs covered with poison. Notes are given on the observations made on the following parasites received from foreign countries. From Japan: *Coccophagus yoshidae*, Nakayama, *C. lunulatus*, How., *Microterys* sp., and a new

species of *Aphycus*, parasitic on *Coccus citricola*, Campbell; an undetermined Coccinellid recorded as an enemy of Aphids and mealybugs; *Leucopis* sp.; *Comperiella bifasciata*, How., parasitic on *Chrysomphalus aurantii* (citrus red scale) and *C. aonidum* (Florida red scale); and *Perissopterus carnesi*, How., parasitic on *Comperiella*. From Florida: *Leucodesmia* sp. probably parasitic on *Laetilia coccidivora*; *L. coccidivora* apparently predacious on eggs of black scale [*Saissetia oleae*]; and *Lecaniobius cockerelli*, Ashm., and *Pyroderces rileyi*, Wlsm., attacking *S. oleae*.

Lecaniobius cockerelli is being propagated satisfactorily, but is not yet ready for general distribution. It is hoped to liberate colonies of *Coccophagus bifasciaticorpus* in the spring; this species attacks the immature stages of *S. oleae* and was received from South Africa in the autumn of 1921. Most satisfactory results have been obtained with the Coccinellid, *Scymnus binaevatus*, also introduced from South Africa. Though primarily introduced against *Pseudococcus maritimus* (grape mealybug), it attacks almost all the mealybugs of economic importance that occur in California. In the field it has so far only been recovered from *P. gahani* (citrophilus mealybug). Other parasites liberated were *Coccophagus modestus*, Silv., and *Encyrtus infelix*, Embleton, the latter parasitising *Saissetia hemisphaerica*. Efforts are being made to re-establish *Tanaomastix abnormis*, Gir., a parasite of *P. citri*.

STRONG (L. A.). **The Bureau of Plant Quarantine.**—*Mthly. Bull. Cal. Dept. Agric.*, xi, no. 11–12, pp. 852–871, 8 figs. Sacramento, Cal., November–December 1922.

The work of the Bureau of Plant Quarantine for the two years ending 31st December 1922 is reviewed. No pests of major importance succeeded in gaining entrance during this period, but an account is given of those to be particularly guarded against as well as the existing quarantine regulations for this purpose.

NOUGARET (R. L.). **The Viticultural Service.**—*Mthly. Bull. Cal. Dept. Agric.*, xi, no. 11–12, pp. 872–874. Sacramento, Cal., November–December 1922.

The grape mealybug [*Pseudococcus bakeri*, Essig] has continued to spread in San Joaquin County, though only slight damage has been done to the grape crop.

Infestation by the Nematode [*Heterodera radicicola*, Greef], previously thought to be confined to nursery stock, has for the past several years been causing serious losses to rooted grape-vines [*cf. R.A.E.*, A, x, 315]. Experiments are being conducted to ascertain the degrees of susceptibility or immunity of various varieties of commercially grown grapes.

TATTERSFIELD (F.) & ROACH (W. A.). **The Chemical Properties of** *Derris elliptica* **(Tuba Root).**—*Ann. App. Biol.*, x, no. 1, pp. 1–17, 2 figs. Cambridge, February 1923.

The work of previous authors on the subject of the insecticidal properties of *Derris elliptica* is reviewed [*cf. R.A.E.*, A, vii, 496].

A detailed account is given of the technique employed for the separation of the constituents of the root, the properties of which are dealt with at length. They comprise a white crystalline derivative usually called " tubatoxin," a series of resins identical with the derride

of Sillevoldt and the tubain of Wray, yellow crystalline derivatives and a liquid resin. The crystallines and resins contain methoxyl groups, and these compounds appear to be interrelated.

By means of organic solvents the poisons may be readily extracted from the roots; 95 per cent. alcohol extracts them together with non-toxic derivatives. Other good solvents are benzene, dry ether and carbon tetrachloride, which have a selective dissolving action on the poisons. For economic purposes benzene and its congeners of alcohol are probably most suitable, provided that the temperature of extraction is not allowed to rise too high; prolonged boiling may cause some loss of toxicity in the extracts owing to chemical change in the tubatoxin.

The amounts of non-toxic constituents vary widely in different consignments and appear to have some value as emulsifying and wetting agents. In the British Isles the root is received in the dry form, so that the use of organic solvents is recommended for the preparation of highly dispersed suspensoids.

Fryer (J. C. F.), Stenton (R.), Tattersfield (F.) & Roach (W. A.). **A Quantitative Study of the Insecticidal Properties of** *Derris elliptica* **(Tuba Root).**—*Ann. App. Biol.*, x, no. 1, pp. 18–34, 3 diagrams. Cambridge, February 1923.

The first experiments were carried out with larvae both bred from eggs and collected in the field, the species concerned being *Pieris brassicae* (cabbage white butterfly), *Malacosoma neustria* (lackey moth), *Phalera bucephala* (buff-tip), *Pteronus ribesii* (gooseberry sawfly) and another sawfly, *Phymatocera aterrima*. Great difficulty was experienced in finding a species the larvae of which would be available throughout the year under artificial conditions. For this purpose the Noctuid, *Polia* (*Hadena*) *oleracea*, was chosen, this moth having recently established itself in tomato houses, where it appears to breed continuously as long as the requisite heat is maintained. Owing to the high mortality of half-grown larvae it was impossible to rear them in sufficient numbers, and the continuous breeding reduced the quality of the strain and produced a large proportion of mis-shapen and infertile eggs as well as irregularity in emergence. It would seem that in most species a rest is essential at some period, and that it is taken whatever the climatic conditions may be. The tests were concluded with larvae of *M. neustria* and silkworms, *Bombyx mori*.

Each caterpillar was dipped for 10 seconds in the liquid to be tested. Taking the various factors into consideration, great numerical accuracy cannot be claimed for the biological side of the work, but nevertheless it is believed that from the qualitative point of view the results are substantially correct. Quantitatively they may be regarded as of a fair order of accuracy.

Pure products prepared from the roots do not appear so toxic as the emulsions prepared from the fresh root by mere maceration with water. An alcohol extraction of the root made in the cold was slowly poured into a solution of saponin in water and the mixture freed from alcohol by distilling off under fairly high vacuum at a temperature not exceeding 35° C. [95° F.]. The pure poisons were dissolved in a minimum quantity of alcohol and treated in the same way, a rather larger amount of saponin being necessary to render the tubatoxin suspensoid permanent.

Extracts of *Derris elliptica* are particularly noxious to caterpillars, the toxic principles of the root being a white crystalline derivative, "tubatoxin," and a golden yellow resin, "derride." As the pure poisons found in the root are solids and only slightly soluble in water, their toxicity appears to depend upon their degree of dispersion.

Tubatoxin and derride appear to be of the same order of toxicity as nicotine to the larvae of *B. mori*.

In experiments with *Aphis rumicis* the action of the poison was extremely slow and uncertain, whereas nicotine oleate in a dose containing a very small quantity of nicotine was immediately and almost completely effective.

Davidson (J.). **Biological Studies of *Aphis rumicis*, Linn. The Penetration of Plant Tissues and the Source of the Food Supply of Aphids.**—*Ann. App. Biol.*, x, no. 1, pp. 35–54, 2 plates, 4 figs. Cambridge, February 1923.

The experiments described were carried out with *Aphis rumicis*, L., on *Rumex*, *Vicia faba*, *Eunonymus europaeus* and *Chenopodium album*; *Macrosiphum rosarum*, Wlk., on rose trees; and *Myzus cerasi*, F., on peach. By means of a flexible, chitinous, piercing organ composed of the maxillary stylets and the mandibles, the Aphids penetrate the tissues of the plant and feed on the cell sap. A description is given of the anatomy and physiology of the parts concerned. Saliva pumped into the plant dissolves a passage for the piercing organ through the walls of the cells and forms a sheath for it, the walls of which are composed of substances produced by the reaction of the saliva on the cell sap. It causes plasmolysis of the cells and disorganisation of the cell contents. With *Aphis rumicis* the piercing organ passes intracellularly through the cortex, only occasionally passing through individual cells. Eventually it reaches the vascular bundles. On beans the phloem elements of the vascular bundles are the chief source of food supply, though other cells, such as the cortex and mesophyll of the leaf, may be tapped for nourishment, especially when the plant is heavily infested. On *Rumex*, xylem vessels are often tapped for food.

The presence of a thick cuticle may prevent young Aphids from piercing into the tissues, and thus inhibit a general infestation of the plant. Investigations should be made of the cell sap of plants under varying cultural conditions, as they are probably associated with the more favourable development and reproduction of Aphids on certain plants. The composition of the excrement of Aphids depends upon the plant and is in close relation to the composition of the cell sap of the plant and the digestive processes of the Aphids.

Le Moult (L.). **Le Parasite du hanneton et de sa larve.**—*Jl. Agric. prat.*, xxxix, no. 12, pp. 238–241, 3 figs. Paris, 24th March 1923.

The infestation of Melolonthid grubs and adult beetles by the fungus, *Isaria densa*, discovered 33 years ago by the author, is described [*R.A.E.*, A, x, 603].

Departmental Activities: Entomology.—*Jl. Dept. Agric. Union South Africa*, vi, no. 3, pp. 199–201. Pretoria, March 1923.

In the Eastern Province the damage done to summer fruits by codling moth [*Cydia pomonella*] and fruit-fly larvae is estimated at £15,000. During December navel oranges were heavily infested with *Icerya*

purchasi, in spite of all stages of the Coccinellids, *Rodolia iceryae* and *Novius cardinalis*, being present in unusually large numbers. *Ceratitis capitata* has been reared from two wild fruits, the common yellowwood [*Podocarpus elongata*] and Cape teak [*Strychnos atherstonei*]. It was also found in fruits of *Sideroxylon inerme*, *Harpephyllum caffrum* and the small red berries of a wild *Asparagus*. Fruits of *Maerua pendulosa* were attacked by an undetermined fly.

A Dipterous parasite of *Zonocerus elegans* has been reared in Natal. In the vicinity of Durban seed heads of Barberton daisy [*Gerbera jamesoni*] were infested with larvae of *Ephestia kühniella* (Mediterranean flour moth).

In the Transvaal the maize stalk borer [*Busseola fusca*] has been controlled by pouring a small cupful of hycol solution (one tablespoonful to one gallon of water) into the tops of each maize plant when about two feet high.

MALLY (C. W.). **Arsenite of Soda as a Locust Poison.**—*Jl. Dept. Agric. Union South Africa*, vi, no. 3, pp. 220–232, 6 figs. Pretoria, March 1923.

The indifferent results obtained with the official locust poison at recommended strength were found to be due to the settling of the poison at the bottom of the drums. Subsequent experiments have shown that treacle is unnecessary in poison baits for locusts, excellent results being obtained with sodium arsenite diluted with water and used as a spray on the surrounding vegetation or on the locusts themselves. From recent observations it is evident that the official locust poison acts by contact rather than as a stomach poison. In view of this fact tests were undertaken with dry sodium arsenite showing the following analysis: Arsenic as As_2O_3=80 per cent., arsenic as As=60 per cent., sodium as Na_2O above 15 per cent. It was guaranteed that 8 lb. would dissolve in 1 gal. water on boiling for ten minutes. During October and November 1922 the powder was spread by means of ordinary hand bellows, and the results were even better than expected, death ensuing in some cases within half an hour. As long as the powder came in contact with the locusts, it destroyed them; even on bright warm days they were moist enough for the dust to stick to them. A breeze is an advantage when applying the dust, as by drifting over the swarm, it enables the treatment to be made more rapidly. Used as a spray, 3 oz. to 4 gals. water, the results obtained were equal to those where official strength arsenite-treacle poison was used. Stronger solutions containing 4 oz. to 4 gals. water showed no repellent action. The poison also enters the tissues of the antennae and affects the nervous system, individuals treated experimentally dying in four or five hours.

Suitable types of bellows for applying the dust are discussed, also the protection of the operator. Preliminary experiments with the powder put up with an explosive in the form of a bomb did not give encouraging results.

JARVIS (E.). **Work of the Division of Entomology.**—*22nd Ann. Rept. Queensland Bur. Sugar Expt. Sta.*, 1921–22, pp. 52–56. Brisbane, 1923.

Most of the information given here on the work in connection with sugar-cane pests has already been noticed from other sources [*R.A.E.*, A, xi, 65, etc.].

Jarvis (E.). **A Fumigant for Cane Grubs.**—*Facts about Sugar*, xv, no. 15, pp. 300–301. [New York,] 1922. (Abstract in *Expt. Sta. Record*, xlviii, no. 1, pp. 58–59. Washington, D.C., January 1923.)

This is a report from the Bureau of Sugar Experiment Stations, Queensland, where paradichlorobenzene has given the best results thus far obtained in cane grub control. When soil that had been dug 9 in. deep and allowed to settle for a few days was treated with a single line of 0·25 oz. injections placed 1 ft. apart and 5 in. below the surface, examination nine days later showed it to be more or less impregnated with the odour of the deterrent to a distance of 1 ft. on each side of the injections. Larvae placed at from 6–8 in. were dead and partly decomposed, those at 9 in. dying but able to move convulsively, and those 1 ft. away alive and apparently normal. The test was repeated later with practically identical results, and further trials, in which the injections were reduced to 80 gr., placed 1 ft. 6 in. apart, also proved satisfactory.

Investigations in very damp, closely packed soil, in a field of first ratoons, have shown that injections of 4 gm. lost 0·5 gm. during a period of 18 days, from which it may be concluded that under such conditions evaporation would continue for about four months. It is worth noting, however, that the deterrent odour remains in the ground long after all traces of its origin have vanished. Soil under cane stools treated on 5th March was found strongly impregnated with the odour on 8th May, three weeks after complete evaporation, from which it may be assumed that a limited area of such contaminated soil, comprising a strip of at least a foot wide, would continue repellent until the odour became less decided.

Paradichlorobenzene (dichlorbenzole) should therefore prove an ideal fumigant for sugar-cane, as it could simply be put in the furrows with sets when planting, and if it was applied during November or December the odour would have ample time to penetrate and render the soil on each side of the stools distasteful to the beetles and deter them from ovipositing in ground thus contaminated. In the event of eggs being deposited near the plants this fumigant would certainly kill any grubs that might hatch from them.

In no instance have experiments with this fumigant been followed by noticeable injury to the growing cane plants.

Ross (W. A.). **Aphids or Plant Lice.**—*Canada Dept. Agric.*, Pamphlet N.S. no. 31, 7 pp., 5 figs. Ottawa, 1923.

A general account is given of the life-cycle of Aphids and the damage they cause, with brief directions for their control under greenhouse, garden and field conditions.

Criddle (N.). **The Hessian-fly in the Prairie Provinces.**—*Canada Dept. Agric.*, Pamphlet N.S. no. 30, 7 pp., 8 figs. Ottawa, 1923.

In view of the steady increase of *Mayetiola* (*Phytophaga*) *destructor*, Say, during 1921 and the damage caused in 1922, particularly in Manitoba and Saskatchewan, a brief account is given of its life-history and habits. The usual cultural remedial measures are recommended. As the wheat-stem sawfly [*Cephus occidentalis*, R. & M.] may be confused with *M. destructor*, the points of difference are given.

NELSON (R.). **The Occurence of Protozoa in Plants affected with Mosaic and related Diseases.**—*Michigan Agric. Expt. Sta.*, Tech. Bull. 58, 30 pp., 18 figs. East Lansing, Mich., December 1922. [Received 27th March 1923.]

An extensive study of bean, clover and tomato mosaic and potato leaf-roll shows that definite protozoan organisms found mainly in the sieve tubes and sieve parenchyma are constantly associated with these diseases.

The organism occurring in bean and clover is apparently a flagellate of new generic rank near to *Leptomonas*, while that of tomato plants is evidently a trypanosome and has only been found in the sieve tubes.

The organism found in potato plants with leaf curl resembles a trypanosome more closely than any other form and is usually associated with the host cell nucleus.

All these organisms lie in a plane parallel to the long axis of the cell and have been found only in longitudinal sections.

Economic Entomology.—*Ann. Rept. Pennsylvania Agric. Expt. Sta., 1921-22*, Bull. 176, pp. 16-17. State College, Pa., October 1922. [Received 27th March 1923.]

Extensive life-history studies have been made on *Eulia velutinana*, Wlk. (apple leaf-roller), and three generations were reared. It was found that the delayed dormant application of lead arsenate comes too early for this moth, as the eggs do not hatch until some time after the application of the spray. Late summer applications towards the end of July and the beginning of August have proved successful in controlling the late feeding generations. Much imformation was secured on the life-history and habits of *Paratetranychus pilosus*, C. & F. (red spider), and good results were obtained with sprays of lime-sulphur or soluble sulphur, but sulphur dust gave little or no control. Field and experimental observations have determined that the cabbage maggot [*Phorbia brassicae*, Bch.] has one complete brood with only partial second and third broods in south-eastern Pennsylvania. The first brood larvae usually damage early cabbage so severely that 50 per cent. die. Some injury may also result to seedlings of late cabbage when these are grown in open beds. The use of tar discs is the most satisfactory measure for small plots, and they should be placed about the plants immediately after planting out. The use of corrosive sublimate, 1-1,000, is preferable in the field and may be applied as late as five days after the plants are set and yet give good results. Two treatments may be necessary in some seasons at intervals of 7-10 days. The screening of late cabbage seed beds has also proved satisfactory.

Field observations for four seasons indicate that tomatos, potatoes, seedlings of late cabbage, radishes, swedes and turnips may be severely infested by Aphids. Experiments were made to determine the efficiency of dusts, and the mixing of them is described. A home-made dust of 2 per cent. nicotine sulphate with kaolin as a carrier proved the most effective. It is, however, cheaper to spray unless the grower mixes his own dust. The fifth year of seasonal investigations of the false red bug [*Lygidea mendax*, Reut.] was completed and showed that the pink spray comes too early to control this species, but the petal or codling moth spray is correctly timed for it. *Phyllocoptes cornutus*, Banks (silver-leaf mite of peach) is recorded for the first

time in Pennsylvania, and *Eulia mariana*, Fern., and *E. quadrifasciana*, Fern., have been recorded for the first time on apple [*cf. R.A.E.*, A, x, 534].

HOLLOWAY (T. E.). U.S. Bur. Ent. **Sugar Cane Insects in 1922.**—*Facts about Sugar*, pp. 72–73. New York, 27th January 1923.

The author is of opinion that injury by the cane-borer [*Diatraea saccharalis crambidoides*] is largely due to the planting of infested seed cane. The use of chemicals in the field appears to be impracticable and will have to be abandoned. It was found that a treatment for 20 minutes in water heated to 122° F. killed 100 per cent. of the borers and the germination of the cane appeared to be stimulated. This treatment has also been found effective against mealybugs. Some parasites imported from southern France against the European corn-borer [*Pyrausta nubilalis*] have been liberated in New Orleans, but it is not yet known whether they will attack the cane-borer in the field, though they did so experimentally. The parasites imported from Cuba were released at 41 plantations during 1919 and 1920, and since that time they have been found in over 60 per cent. of them. The fact that they occur at all shows that they live through the winter and continue to kill the borers.

In small fields in Mississippi cultural measures that are not practicable on large plantations can be adopted. Large grasses growing near infested maize and cane fields should be destroyed, as the cane-borer has recently been found hibernating in *Andropogon glomeratus* at about the surface of the ground. Other recommendations against this moth in Mississippi have already been noticed [*R.A.E.*, A, xi, 110].

MILLER (D.). **The Fiji Lemon-weevil** (*Elytroteinus subtruncatus*, **Frm.**).—*N.Z. Jl. Agric.*, xxvi, no. 1, pp. 34–35, 2 figs. Wellington, 20th January 1923.

A brief description is given of *Elytroteinus subtruncatus*, Frm., which was found in lemons received in New Zealand from the Cook Islands. This weevil was first recorded from Fiji in 1881, and recently was found at Honolulu infesting the roots of the white ginger-plant, *Hedychium coronarium*, but it has not previously been recorded on lemons. The fruit was attacked at the base of the stalk, the larva working its way through the peel and tissue lying immediately thereunder; the core was also found to be attacked. Only a single larva was found in one fruit, and it is probable that the female punctures the base of the stalk and lays her egg there. Pupation took place in the fruit, and if the latter decayed before the adult developed, its emergence was greatly hindered or even prevented.

MYERS (J. G.). **Life-history of** *Siphanta acuta* **(Walk.), the Large Green Plant-hopper.**—*N.Z. Jl. Sci. & Tech.*, v, no. 5, pp. 256–263, 4 figs. Wellington, December 1922.

Siphanta acuta, Wlk., of which *Phalainesthes schauinslandi*, Kirk., is a synonym, is common in New South Wales, and is also found in Queensland and Tasmania. This Flatid has been introduced into Hawaii where it feeds on guava, *Acacia koa* and other trees, as well as

on coffee, having become a pest of considerable importance on the latter.

It was first recorded in New Zealand in 1909, and its distribution is given, with a description of all stages. The younger instars feed on the leaves, but the older ones prefer the stem. Its favourite food in the North Island is *Citrus*, and in Nelson ornamental shrubs. The eggs are parasitised in Hawaii by a Hymenopteron, *Aphanomerus pusillus*. This parasite, or a closely allied one, was observed in New Zealand emerging on the 25th May, when unhatched eggs, a few nymphs of all ages, and some adult plant-hoppers were also observed. The steel-blue ladybird, *Orcus chalybeus*, also destroys the eggs in citrus orchards. The nymphs were found to thrive on *Coprosma robusta* kept fresh for a week or more.

JEGEN (G.). **Beiträge zur Kenntnis des Heu- und Sauerwurmes und seiner Bekämpfung mit besonderer Berücksichtigung der Arsenverbindungen.** [Contributions to a Knowledge of the Spring and Summer Generations of Vine-Moths and their Control, with particular Regard to Arsenical Compounds.]—*Schweiz. Ztschr. Obst- u. Weinbau*, xxxii, nos. 2–6, pp. 30–35, 49–53, 65–69, 79–84, 97–98, 8 figs. Frauenfeld, 27th January, 10th & 24th February, 10th & 24th March 1923.

Both the spring and summer generations of vine-moths [*Clysia ambiguella*, Hb., and *Polychrosis botrana*, Schiff.] are permanent pests of vineyards in eastern Switzerland. Dry springs favour the destruction of the pupae in light soils.

P. botrana has shorter developmental periods than *C. ambiguella*. In favourable years it is able to produce a third generation, which does injury similar to that of the summer (second) generation. It deposits more eggs also, an average of 76 as against 42 for *C. ambiguella*.

Nicotine has been largely used, but if the summer generation is to be checked it is necessary to spray the bunches, and this insecticide may delay ripening, and affects the flavour. A number of tests were made with nicotine, lead arsenate and Urania green, each added to Bordeaux mixture and sprayed once only. Lead arsenate was by far the best for killing the first generation, and this excellent effect is largely due to its conferring a high degree of adhesiveness on the Bordeaux mixture. The actual toxic action of lead arsenate was about the same as that of Urania green, but the lasting adhesiveness of the spray (Bordeaux mixture of 2 per cent. strength with ½ per cent. lead arsenate added) proved more effective during the prolonged feeding of the first generation. The traces of poison ultimately found as a result of this treatment are exceedingly slight, and a very thorough spraying against the first generation renders it unnecessary to spray the grapes against the second in summer.

CARPENTER (G. H.). **The Colorado Beetle.**—*Jl. Dept. Agric. & Tech. Instr. Ireland*, xxii, no. 4, pp. 372–374. Dublin, February 1923.

A brief account is given of the bionomics and control of *Leptinotarsa decemlineata*, Say (Colorado beetle) in order that Irish farmers and gardeners may take prompt measures to prevent its establishment should it be introduced from France, where it has recently appeared on potatoes.

Nguyên-công-Tiêu. **Note sur une Cécidomie du riz** (*Pachydiplosis oryzae*, **Wood-Mason**).—*Bull. écon. Indochine*, xxv, no. 156, pp. 590-593, 1 plate. Hanoi-Haiphong, September-October 1922.

The Cecidomyiid, *Pachydiplosis oryzae*, Wood-Mason, causes great deformation and loss among the rice plants grown in Tonkin. A loss of from 50 to 100 per cent. has been recorded in some localities. It is generally the young plants that are attacked, and some varieties suffer more than others. Infested plants are undersized, the leaves are yellow at the tips and the base of the plant throws out a number of shoots, in the midst of which grows a gall in the form of a long, milky tube, terminating in a green tip. At the base of this gall lives the apodous larva, which feeds on the plant tissue. Pupation occurs within the tube and, shortly before transformation to the adult, the pupa works its way to the top; the tube breaks at the junction of the green tip, and the adult escapes. The fly apparently lives on vegetable juices; in captivity, females oviposited on the stems of young rice plants or on the walls of the receptacle, and death occurred after about five days.

The larvae of *P. oryzae* are parasitised by a small Hymenopteron. Flooding the young rice fields proved useless, as although the larvae might be destroyed by several days' submersion, the pupae can make their way to the top of the tube and have no need of food. The remedy suggested is to pull up and destroy all plants attacked before pupation occurs. *P. oryzae* has also been recorded as attacking a species of *Panicum*, two species of which, *P. scrobiculatum* and *P. conjugatum*, grow abundantly on the dams of the rice fields; if these prove to be food-plants of the fly, they should be destroyed at the first sign of infestation.

A translation is appended of previous data concerning *P. oryzae* that were recorded at the second entomological meeting at Pusa.

Pham-tu-Thiên. **Un procédé de conservation des collections entomologiques en Cochinchine.** *Bull. écon. Indochine*, xxv, no. 156, pp. 607-608, Hanoi-Haipong, September-October 1922.

It is generally thought that the climate of Indo-China, and particularly of Cochin China, renders impossible the preservation of insect collections. Benzine, creosote, formol, phenic acid, etc., which are generally used in Europe for this purpose, are not sufficiently toxic to kill destructive insects, and have still less effect on the eggs. The author explains the technique of a method by which he has preserved insects by means of plaster containing potassium cyanide and naphthaline.

Picard (F.). **L'Hibernation des Chenilles de** *Pieris brassicae*, **L.**—*Bull. Biol. France & Belgique*, lvii, no. 1, pp. 98-106. Paris, 1923.

In southern France the first half of the hibernation of *Pieris brassicae*, L., is passed in the larval stage. Since its parasite, *Apanteles glomeratus*, is only to be found after the end of October as a hibernating larva and always lays its eggs in the caterpillars as soon as they hatch, the larvae of *P. brassicae*, from eggs laid in autumn, are not exposed to attack. Moreover the later the pupal stage of *P. brassicae*, the less likely are the pupae to fall victims to *Pteromalus puparum*, which attacks them at least as late as the beginning of December.

SCOTT (H.). **Longevity of a Cerambycid Larva.**—*Ent. Mo. Mag.*, lix, p. 90. London, April 1923.

The existence of a Cerambycid larva in a piece of carved stained and polished walnut wood, brought originally from Spain, for at least 20 years is recorded. Identification of the species has so far been impossible, though it appears to be close to *Aromia*.

THEOBALD (F. V.). **Aphides from Bangalore, S. India.**—*Ent. Mo. Mag.*, lix, p. 91. London, April 1923.

The species recorded are: *Aphis tavaresi*, Del Guer., on limes (*Citrus medica*) and oranges (*C. aurantium*); *A. gossypii*, Glov., on *Solanum nigrum* and guavas (*Psidium guayava*); *Myzus persicae*, Sulz., on tobacco; *Pentalonia nigrinervosa*, Coq., on *Musa sapientium*; *Greenidia artocarpi*, Westw., on *Artocarpus integrifolia*; and *Theridaphis ononidis*, Kalt., on *Medicago sativa*.

UVAROV (B. P.). **A Revision of the Old World Cyrtacanthacrini (Orthoptera, Acrididae). I. Introduction and Key to Genera. II. Genera** *Phyxacra* **to** *Willemsea*.—*Ann. Mag. Nat. Hist.*, xi, nos. 61 and 62, pp. 130–144 and 473–490, 7 figs. London, January and April 1923.

The contents of these papers are indicated by their titles.

FULLER (C.). **Two New Termites from Uganda.**—*Ann. Mag. Nat. Hist.*, xi, no. 61, pp. 191–192, 1 fig. London, January 1923.

The species described are *Cubitermes ugandensis*, sp. n., and *Termes (Odontotermes) kibarensis*, sp. n.

SAMPSON (F. W.). **Notes on the Nomenclature of the Family Scolytidae.**—*Ann. Mag. Nat. Hist.*, xi, no. 62, pp. 269–271. London, February 1923.

The author gives reasons for being unable to accept *Stephanoderes coffeae*, Haged., and *Xyleborus fornicatior*, Eggers, as valid species [*R.A.E.*, A, x, 572].

SAMPSON (F. W.). **Previously undescribed Scolytidae and Platypodidae from the Indian Area.**—*Ann. Mag. Nat. Hist.*, xi, no. 63, pp. 285–289. London, March 1923.

The species described are: *Platypus abruptus*, sp. n., from *Quercus* sp.; *P. curtatus*, sp. n., *Xyleborus recidens*, sp. n., *X. turbineus*, sp. n., and *X. elegans*, sp. n., from sal [*Shorea robusta*]; and *X. bicolor*, Blandf., var. α.

MARSHALL (G. A. K.). **On New Curculionidae from South Africa.**—*Ann. Mag. Nat. Hist.* xi, no. 64, pp. 531–552, 1 plate. London, April 1923.

Among the species dealt with is *Protostrophus perditor*, sp. n., recorded as injuring the foliage of maize and potatoes in the Transvaal.

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RIESLE S. (R.). **Una nueva plaga de la agricultura. La Mosca de las Cerezas.** [A New Pest of Agriculture. The Cherry Fly.]—*Agronomía*, xii, no. 7–8, p. 6. Santiago, Chile, July–August 1922. [Received 2nd April 1923.]

An Ortalid fly, *Ceroxys fasciata*, Macq., has been bred from maggots infesting cherries. In Chile both cherries and plums are infested by another fly, *Rhagoletis cingulata*, against which a spray containing lead arsenate ½ lb., newly-slaked lime ½ lb., water 25 gals. and molasses ½ gal., is recommended when the adults appear in the first half of November. All fallen fruits should be removed and burned, and the ground should be worked after picking and again in autumn to expose the pupae.

CORRÊA PACHECO (J. E.). **Pro combate ás sauvas.** [Against *Atta sexdens*, L.]—*Chacaras e Quintaes*, xxvii, no. 2, pp. 119–121. S. Paulo, February 1923.

The various methods of destroying the leaf-cutting ant, *Atta sexdens*, L., are noticed.

MINOTT (C. W.). **The Gipsy Moth on Cranberry Bogs.**—*U.S. Dept. Agric.*, Bull. 1093, 19 pp., 6 pls., 4 figs. Washington, D.C., 16th October 1922. [Received 3rd April 1923.]

The problem of infestations of *Porthetria dispar*, L. (gipsy moth) in cranberry bogs varies according to whether the bog is a wet or dry one. It is known that no hatching of the eggs occurs on bogs that are flooded from 1st December to 1st May. Insects that are not hatched on the bogs are chiefly carried there by wind dispersal, and if the flooding is held until after the maximum time of wind dispersal has passed, young caterpillars that fall into the water will be drowned. It is sometimes desirable to hold the flooding from about 1st to 15th June to control *Rhopobota naevana*, Hb. (blackhead cranberry worm), and when this is done, gipsy moth infestation is controlled at the same time. The maximum wind dispersion generally occurs about 13 or 14 days after the first hatching is noticed, and this should be carefully watched for. In flooding, complete submergence is essential; otherwise numbers of larvae will escape by climbing up any plants that are above the water. If any shoots project from the water, the larvae should be brushed from them with a handrake and the shoots pushed under the water several times.

On dry bogs, the application of arsenical poison when the caterpillars are in their first stage offers the best remedy. This should be done soon after hatching is observed on the uplands, and the spray should be applied in mist form so that as much poison as possible may settle on the terminal buds. The formula recommended is 6 to 8 lb. lead arsenate paste (or half the amount in dry form) to 100 U.S. gals. water, and if infestation with later-stage larvae should occur, a stronger solution is necessary, such as 12 to 15 lb. paste to 100 U.S. gals. water. It is thought that with more efficient apparatus for the use of dry poison, this may prove the more economical and satisfactory method for dry bogs.

After the second larval stage is reached and danger of wind dispersal is reduced to a minimum, heavy infestations may occur on the uplands near cranberry bogs, and if food becomes scarce, the caterpillars may invade the bog. It is suggested that the woodland border of the bog

should be cut back for about 100 ft. If the caterpillars are actually migrating towards the bog, an open ditch should be dug on the upland, back from the bog border, about 12 to 15 in. deep by 18 in. wide, the earth being thrown towards the migrating larvae and the side of the ditch nearer the bog being made perpendicular. At the top of the perpendicular side a board about 1 ft. wide should be placed at an angle of 45°, overhanging the ditch, supported by stakes driven into the soil. Earth should be banked on the outside of the board to close all crevices and the under side of the board and supports should be smeared with sticky tree-banding material before being placed in position. Larvae that fall into the ditch should be sprinkled with crude oil from a watering-can. Variations of this trench method to meet different degrees of infestation are suggested.

McDonnell (C. C.), Smith (C. M.) & Coad (B. R.). **Chemical Changes in Calcium Arsenate during Storage.**—*U.S. Dept. Agric.*, Bull. 1115, 28 pp., 52 graphs. Washington, D.C., 28th November 1922. [Received 3rd April 1923.]

Calcium arsenate as prepared commercially in the dry powder form for insecticidal purposes absorbs carbon dioxide slowly from the atmosphere during storage, and increases in water-soluble arsenic-oxide content, unless it is packed in containers that are practically airtight. A number of tests have been made in which various containers have been used, and the rates of changes have been closely followed. It is found that chemical changes can be almost completely avoided by the use of tight sheet-metal drums for storage. Other types of commercial containers may be ranked for value in the following order: heavy hardwood barrels, veneer drums (both unlined and paper-lined) and sugar barrels (both unlined and paper-lined).

Quaintance (A. L.) & Siegler (E. H.). **The more important Apple Insects.**—*U.S. Dept. Agric.*, Farmers' Bull. 1270, 95 pp., 192 figs. Washington, D.C., September 1922. [Received 3rd April 1923.]

A brief account is given of each of 64 apple pests occurring in the United States, including their habits and appearance. Remedial measures are discussed and recommendations are made in the form of a spray calendar, adapted to the various conditions of the different parts of the country.

Back (E. A.). **Weevils in Beans and Peas.**—*U.S. Dept. Agric.*, Farmers' Bull. 1275, 35 pp., 29 figs. Washington, D.C., August 1922. [Received 3rd April 1923.]

This is a revision of a previous bulletin on Bruchids in beans and peas [*R.A.E.*, A, vii, 229], additional information being given with regard to fumigation with hydrocyanic acid gas and the most suitable sacks for storing purposes.

Rules and Regulations governing the Importation of Cotton and Cotton Wrappings into the United States.—*U.S. Dept. Agric., Fed. Hortic. Bd.*, 6 pp., multigraph. Washington, D.C., 24th February 1923.

Cotton may only be introduced into the United States at a port of entry approved by the Federal Horticultural Board, must be accompanied by a permit authorising importation, and must be

disinfected under official supervision. Cotton that has been so manufactured as to have eliminated all seed and to have destroyed all insect life, and is covered with satisfactory wrappings, may be exempt from disinfection. Cotton previously exported from the United States may be re-admitted without disinfection if there is proof that no danger to the cotton cultures of the United States is involved.

Cotton grown in the Imperial Valley, Lower California, Mexico, may be introduced without restriction as long as the pink bollworm [*Platyedra gossypiella*] does not exist there and effective quarantine measures are being maintained.

HOWARD (L. O.). **Report [1921-22] of the Entomologist.**—*U.S. Dept. Agric.*, 32 pp. Washington, D.C., 1922. [Received 3rd April 1923.]

The work of inspection in connection with the Japanese beetle [*Popillia japonica*] has been thoroughly carried out; and some 213 sq. miles in New Jersey and about 57 in Pennsylvania are now known to be infested. Although ordinary arsenical sprays are not effective against the adults, heavier doses of lead arsenate will apparently kill 50 to 60 per cent. of them. Other poisons are being investigated, including metallic cyanides such as those of nickel and copper. Organic chemicals are also being studied. A contact insecticide of sodium soy-bean soap will kill about 90 per cent. of the beetles and does not injure foliage [*R.A.E.*, A, x, 533]. The best results against larvae in the soil were obtained with paradichlorobenzene, using 300 lbs. to the acre, at a depth of about 1 in., with the drills 4 in. apart; 75 per cent. of the grubs were killed in this manner. For the fumigation of potting soil 1 lb. of carbon bisulphide to a cubic yard of soil is used for 48 hours at a temperature above 50° F. Lead arsenate is the best soil insecticide, but further investigation is required regarding the resistance of plants to this treatment. The destruction of larvae in soil by cultural practices is being studied. The feeding habits of the beetle and larva have been investigated [*R.A.E.*, A, x, 533]. The search for parasites of the beetle in Japan has been continued; a Tachinid parasite has been collected in numbers and liberated in New Jersey, and another Tachinid or Dexiid parasite has been found in Japan and Korea, as well as a parasitic Scoliid of the genus *Tiphia*. Another parasite is being sent from Hawaii.

It is hoped that paradichlorobenzene may prove an effective remedy for the peach borer [*Aegeria exitiosa*] on apricot, prune, etc., in the Santa Clara Valley, and that its use may be extended to trees of 2 to 3 years [*R.A.E.*, A, viii, 189; xi, 17, etc.]. San José scale [*Aspidiotus perniciosus*] is again becoming troublesome in certain parts of the country, especially in apple orchards in the Ozarks. A new dormant spray has been developed, composed of 2 per cent. engine oil, thoroughly emulsified with potash fish-oil soap. This has proved effective, cheap, and easy to use. Used at a strength of about $1\frac{1}{2}$ per cent., either alone or with Bordeaux mixture, it has been successful against the young stages. The grape-berry moth [*Polychrosis viteana*] is being held in check by timely spraying, but several species of grape leafhoppers are increasing in numbers and require remedial measures. Magnesium and calcium arsenates have proved less satisfactory in sprays for grapes than lead arsenate owing to injury to foliage and fruit. Casein in the spray gives good adhesive properties but the spray does not spread over the surface of the berry as readily as when resin-fish-oil soap

is used. It is suggested that a small amount of soap be added to the casein-Bordeaux-lead-arsenate spray. Dormant spraying against the grape mealybug [*Pseudococcus bakeri*] with a petroleum oil emulsion gives excellent results, and paradichlorobenzene against *Phylloxera* is promising.

A further 3,645 sq. miles have been quarantined against the gipsy moth [*Porthetria dispar*], while seven towns have been released from quarantine. The small colonies reported from New York in the previous year [*R.A.E.*, A, x, 173] in five localities were inspected and treated, and no infestation has been found this year. Scouting for brown-tail moth [*Nygmia phaeorrhoea*] has resulted in a large decrease of the infested area, and 2,342 sq. miles have been released from quarantine. Gipsy-moth conditions are being studied in Japan and Europe for the purpose of securing parasites and determining the fluctuations of the insect and injuries caused by it in its original homes. Parasites of both moths have already become established in New England and have been found in large numbers. The difficulty is that all the different species concerned are not sufficiently abundant over a wide area to produce a reasonable measure of control.

An outbreak of the European corn borer [*Pyrausta nubilalis*] has been discovered on the islands in Lake Erie and along the entire shore of the Lake in New York, Pennsylvania and Ohio and in some townships of Michigan. It is thought that the moths may have been blown across the lake from the Canadian side. As this new centre of infestation is in close proximity to the principal maize belt of the country, it is likely that infestation will reach that region within the next few years. Parasites of the borers are constantly being shipped from Europe; more than 500,000 of one species were liberated during the summer of 1922, as well as many other species. Steps are being taken to establish one species of parasite on native corn borers in the South Atlantic and Gulf States so that it will be present to attack *P. nubilalis* if it should spread to those regions. Many other lines of research are being followed up against this pest, including the use of chemicals as weed killers to control it in weedy areas. Against the sorghum midge [*Contarinia sorghicola*] an effective preventive method, based on cultural practices, has been devised. Outbreaks of the so-called green bug [*Toxoptera graminum*] have been found to be due entirely to the presence of self-sown grain, which permits uninterrupted breeding throughout the year. Grasshoppers are still very destructive, but it is estimated that in North Dakota and Wyoming alone about £120,000 worth of crops has been saved by the expenditure of a little over £4,000. State and Federal work against the Hessian fly [*Mayetiola destructor*] has resulted in reducing the insect to minimum numbers except where farm practices are neglected. The method of dusting with arsenicals against the alfalfa weevil [*Hypera variabilis*] further simplifies its control and obviates the necessity of hauling water for spraying purposes in the arid regions.

Many lines of investigation for dealing with insects affecting stored products have been taken up. Attention is being given to certain woods that are likely to have insecticidal value, such as cedar, redwood or camphor. Cedar chests, while they cannot be depended upon to kill the adults or eggs of the clothes moth, or the half grown to full-grown larvae, do kill very young larvae. Cold storage is a promising method for the destruction of bean and pea Bruchids, and fumigation is being investigated as a protection for stocks of both raw and manufactured products of various kinds.

Citrus fruits attacked by red spider [*Paratetranychus pilosus*] have been successfully treated with a distillate cresylic acid soap emulsion spray, and the value of liquid hydrocyanic acid gas is being studied. The dusting method against citrus thrips [*Scirtothrips citri*] was found in California to be decidedly inferior to spraying. Experiments are in progress to develop an adhesive for sulphur on citrus foliage. Fungous diseases of the citrus mealybug [*Pseudococcus citri*] have been studied. Infested mealybugs have been reared on potato sprouts and the fungus disseminated for use as a supplement to sulphur sprays. Investigations of fungous parasites of whitefly [*Dialeurodes citri*] and purple scale [*Lepidosaphes beckii*] have shown that by spraying with a spore solution, chiefly during the crawling stages, about 85 per cent. can be killed, provided the food-plant is protected from rain after treatment. A medium is needed that will serve to make the spores adhere to the leaves in spite of rain.

Other pests of subtropical fruits that have been investigated and reported upon elsewhere include *Trialeurodes floridensis* (avocado whitefly), *Protopulvinaria pyriformis* and *Pseudococcus nipae* (coconut mealybug) on avocado, and *Toxotrypana curvicauda* (papaya fruit-fly). In Hawaii investigations have been made into the activities of the introduced parasites of the fruit-fly [*Ceratitis capitata*]. Four species of parasites of Bruchids were sent from Texas to Hawaii in July 1921, and one of them (*Lariophagus texanus*) has become well established. The degree of parasitism of Bruchids in algaroba beans by the egg parasite, *Uscana semifumipennis*, and by the larval parasite, *Heterospilus prosopidis*, has been studied. In the Panama Canal Zone particular attention has been given to *Heilipus perseae* (avocado weevil), *Stenoma catenifer* (avocado seed-moth) and *Aleurocanthus woglumi* (citrus blackfly). Against the strawberry root worm [*Typophorus canellus*], fumigation with hydrocyanic acid gas is recommended, using $1\frac{1}{2}$–2 oz. to 1,000 cu. ft. of space. This is suitable for a single unit type of house, and by using heavy muslin curtains the gas may be confined to any section of an open-range house. As a remedy for *Rhizoglyphus hyacinthi* (bulb mite), paradichlorobenzene gave the best results. Frequent fumigation of greenhouses with weak strengths of gas is found to keep the houses free from the usual pests without injury to the plants. *Pseudaonidia duplex* (camphor scale) is too widespread for eradication to be possible, and a laboratory has therefore been established at New Orleans to study it.

Epilachna corrupta (Mexican bean beetle) is rapidly spreading northward. The application of arsenicals to bean plants in the south-eastern United States is more risky than in the west or south-west; the formula recommended is commercial basic lead arsenate, used as a dust or as a spray at the rate of $1\frac{1}{4}$ lb. to 50 U.S. gals. water. Standard lead arsenate is too injurious to bean foliage. Calcium arsenate and zinc arsenite are injurious when used as dusts undiluted, but the former can be used safely when diluted with 9 parts of hydrated lime. A maximum of 4 generations has been recorded; in the south-east the beetle requires at least 2 to maintain itself, and in the west and south-west a partial second generation is the rule. Marked beetles have been observed to fly five miles within a few days. The beetles migrate to the woodlands and winter in sheltered places. Alternative food-plants are cowpeas, beggar weed, alfalfa and sweet clover, beggar weed being apparently preferred to any food-plant except beans. Parasites are being searched for in Old Mexico. Against the pea

aphis [*Acyrthosiphon pisi*] the most successful remedy has been ¾ U.S. pint of nocotine sulphate and 8–10 lb. soap to 100 U.S. gals. water. *Laphygma exigua* (beet army worm) on peas has a maximum of 5 generations annually in southern California, though ordinarily only 4 occur. Lead arsenate, 3 lb. to 100 U.S. gals. water is the best spray. Nicotine dust has proved valuable against the common cabbage worm [*Pieris rapae*], cabbage flea-beetles and Aphids, and also for *Haltica ligata* (strawberry leaf-beetle), which has been troublesome in Louisiana, and, in a 1·6 per cent. dust, against the striped cucumber beetle [*Diabrotica vittata*].

Further study has been made of calcium arsenate dust as a remedy for the cotton boll weevil [*Anthonomus grandis*]. The saddle gun, or mule-back gun, promises to be useful in this respect. It is found that in some localities the use of calcium arsenate so reduces the natural enemies of the cotton aphis [*Aphis gossypii*] that it becomes seriously injurious. The mule-drawn dusting machine described in the previous report [*R.A.E.*, A, x, 174] for use against the tobacco hornworm [*Protoparce*] has given very good results. Tobacco fields were seriously injured by Crambids, particularly *Crambus caliginosellus* and *Acrolophus popeanellus*. A poisoned bait containing an attractant killed 86–93 per cent. of the former. Besides the Cuban parasite introduced for the sugar-cane borer [*Diatraea saccharalis crambidoides*] [*loc. cit.*], a Braconid introduced from southern France against the European corn-borer has been liberated among this moth and has bred on it successfully. Paradichlorobenzene is being tested against the larvae in the seed cane after planting. This moth has also been found damaging rice in Louisiana.

The work in connection with insects affecting forest and shade trees is reviewed. Certain practices that have proved their value include continuous logging operations as a means of preventing epidemics of tree-killing insects (which are always found to occur in irregular cycles); the submergence of hardwood in water, which renders it immune to powder-post beetles after the wood is seasoned; the use of orthodichlorobenzene or paradichlorobenzene dissolved in kerosene for killing borers in the wood; and the solar-heat method of killing insects in the sapwood of sawlogs.

The progress of bee culture is reported upon, and the regulations governing the introduction of bees are quoted.

Haywood (J. K.). **Report [1921–22] of the Insecticide and Fungicide Board.**—*U.S. Dept. Agric.*, 8 pp. Washington, D.C., 1922. [Received 3rd April 1923.]

The work of the Insecticide and Fungicide Board for the year ending 30th June 1922 is briefly reviewed; it includes investigations to determine the active principles of two species of larkspur (*Delphinium consolida* and *D. staphisagria*) and their possible insecticidal value, and these are to be continued in 1923. A portion of the work in connection with investigations on calcium arsenate has been completed [*R.A.E.*, A, xi, 259].

Leiby (R. W.) & Gill (J. B.) **The Plum Curculio on Peaches in North Carolina. Its Life-history and Control.**—*Bull. N. Carolina Dept. Agric.*, 23 pp., 6 figs. Raleigh, N.C., March 1923.

The life-history and habits of the plum curculio [*Conotrachelus nenuphar*] as occurring in North Carolina are described. It is an

important factor in the growing of peaches in the State and has been the object of a special study. Orchards must be kept clear in winter of piles of rubbish or any other shelter for the weevils, and the same applies to wooded or waste land in the vicinity. It is advisable when possible to burn such land over from 200 to 300 yards from the orchard. A spray of 1 lb. powdered lead arsenate, with lime-water in which 3 lb. of good stone lime has been slaked, to 50 U.S. gals. of water, should be used immediately after the petals fall, and again about 10 days later when the calyces are being shed ; and a spray of 1 lb. powdered lead arsenate with each 50 U.S. gals. of 8 : 8 : 50 self-boiled lime-sulphur should be applied about two weeks later (that is, about four weeks after the petals have fallen), and the same again about four weeks before each variety is due to ripen. If dust is used, the mixture recommended is 80 per cent. sulphur, 5 per cent. lead arsenate and 15 per cent. hydrated lime, the times for treatment being the same as in the case of the liquid spray. Directions for preparing and applying these sprays are given.

As many larvae develop in dropped fruit in the spring, it is essential that these should be picked up, particularly during late April and early May, and disposed of by burying with quicklime in a pit with the top layer two feet below ground level, or by boiling. During May, July and the first half of August, when larvae and pupae are present in numbers in the soil, frequent cultivation will destroy some of them, but at other times it is not of great benefit, particularly in the sandy type of soil characteristic of the region.

LOVETT (A. L.). **Tree-hopper as an Apple Pest.**—*Better Fruit*, xvii, no. 9, pp. 9 & 24. Portland, Oregon, March 1923.

Stictocephala festina, Say (three-cornered alfalfa hopper) has recently been doing considerable damage to apple trees in Oregon, attacking chiefly the two-year-old wood of the smaller twigs, giving them a rough appearance, similar to that produced by the buffalo tree-hopper [*Ceresa bubalus*, F.]. This is apparently the first record of this insect as an apple pest in the north-western States, and its life-history is not well known under these conditions, though it has been dealt with elsewhere [*R.A.E.*, A, iii, 333]. In Oregon the immature stages feed on lucerne in the orchard during the summer. Adults appear during August and September, and the females puncture the apple twigs for oviposition purposes. Eggs began to hatch in outdoor breeding cages in late April, about 90 per cent. hatching within a few hours. The young larvae immediately drop on to the vegetation under the trees. They require about 35 to 114 days to mature and evidently prefer lucerne, for there is no record of their injury in any orchard where there is not a permanent cover crop of this plant.

If the cover crop were destroyed, it would probably result in extermination of the hoppers, but this is not in many cases a practicable remedy. A spray of oil 8 : 100 against the eggs in the twigs might be tried, but the oil is expensive and it is doubtful whether it would reach them sufficiently to be effective. Perhaps the most practical remedy is a spray of 1 U.S. pint nicotine, 4 lb. soap (or 1 lb. spreader) to 100 U.S. gals. of water, or a dilute oil emulsion spray, applied to the cover crop immediately after the larvae have appeared from the eggs. The spray should be applied about the base of the trees and for a few feet out, and if any larvae seem to remain on the trees, the spray should be directed there also.

CHASE (W. W.). **The principal Parasites of the Peach.**—*Georgia State Bd. Ent.*, Bull. 61, 43 pp., 13 plates. Atlanta, Ga., June 1922. [Received 4th April 1923.]

This is a revision of two bulletins previously noticed [*R.A.E.*, A, v, 264; viii, 302]. The insect pests dealt with are *Aegeria* (*Sanninoidea*) *exitiosa*, Say (peach tree borer) against which paradichlorobenzene is recommended as a soil fumigant [*R.A.E.*, A, viii, 189; xi, 17]; *Conotrachelus nenuphar*, Hrbst. (plum curculio), for which the remedies advocated are cultivation, lead arsenate sprays, collection of dropped fruit, and the treatment of hibernation quarters by deep ploughing in the autumn and burning of woodlands adjacent to orchards; *Aspidiotus perniciosus*, Comst., which is partly controlled by the fungi, *Sphaerostilbe coccophila* (red-headed fungus) and *Myriangium duriaei* (black fungus), and for which the remedies suggested are liquid lime-sulphur and soluble sulphur; and *Scolytus rugulosus*, Ratz. (shot-hole beetle borer), against which all infested boughs should be cut out and burnt and all prunings promptly burnt. The Nematode, *Heterodera radicicola*, Greef, causes the formation of galls or root knots on peach trees.

The relative merits of lime-sulphur concentrates and lime-sulphur wash as remedies are discussed, and instructions are given for making the concentrate.

The life-history and habits of each species are briefly dealt with, and a spray schedule suitable for the Georgia peach orchards is given.

Curculio and Brown Rot Control.—*Georgia State Bd. Ent.*, Circ. 37, 8 pp. Atlanta, Ga., January 1923.

This is a report of progress of the experimental work against curculio [*Conotrachelus nenuphar*] and brown rot in 1922. The schedules of peach spraying and dusting are given. Very marked benefit resulted from spraying, which showed pronounced superiority over dusting, the best results being obtained from four applications of lead arsenate, using 1 lb. to 50 U.S. gals. of water. Some scorching of the foliage resulted, but the benefit more than compensated for the injury.

SNAPP (O.). U.S. Bur. Ent. **The Control of Peach Curculio and Peach Tree Borer.**—*Proc. 17th Ann. Convention Tennessee State Hortic. Soc., Nurserymen's Assoc. & Beekeepers' Assoc., Nashville, Tenn., Jan. 1922*, pp. 29–41, 3 figs. Knoxville, Tenn., 1922.

A study of the serious problem of the peach curculio [*Conotrachelus nenuphar*] was undertaken in the autumn of 1920 in Georgia in order to save the crop for 1921, with a result that one of the best peach crops ever produced was harvested. The character of the injury caused by the weevil is described, and an account is given of the various measures adopted in orchards, such as clean cultivation, the destruction of fallen peaches, disking, jarring and the spray and dust schedules for 1922.

The peach tree borer [*Aegeria exitiosa*] is the next worst pest in the south, and the use of paradichlorobenzene for its control is discussed.

WEISS (H. B.), HEADLEE (T. J.) & COOK (M. T.). **Report of the Inspection Service. Plant Inspection.**—*6th and 7th Ann. Repts. New Jersey State Dept. Agric.*, Bulls. 29 and 33, pp. 43–57 and 37–47. Trenton, N.J., September 1921 and 1922. [Received 4th April 1923.]

The work carried on during 1921 and 1922 in New Jersey is briefly outlined; it included investigations in connection with *Popillia japonica*, Newm., and gipsy moth [*Porthetria dispar*, L.]. Much of the information has been already noticed from other sources.

The quarantine and inspection regulations enforced during the period under review are noticed. The brown tail moth [*Nygmia phaeorrhoea*, Don.] was found on apple stock imported from France in 1921 and egg-masses of the gipsy moth on spruce from Massachusetts.

DAVIS (J. J.). **Control of the Peach Tree Borer.**—*Purdue Univ. Dept. Agric. Extens.*, Leaflet 121, 4 pp., 2 figs. LaFayette, Ind., March 1922. [Received 4th April 1923.]

The use of paradichlorobenzene for the control of the peach tree borer [*Aegeria exitiosa*, Say] is described [*R.A.E.*, A, viii, 189; xi, 17, etc.]. This treatment in Indiana has destroyed 90 to 100 per cent. of borers.

DAVIS (J. J.). **Burning Chinch Bugs in Winter Quarters. Farming Practices in Relation to Chinch Bug Control.**—*Purdue Univ. Dept. Agric. Extens.*, Leaflets 125 and 126, 4 pp., 3 figs.; 4 pp., 2 figs. LaFayette, Ind., February and March 1922. [Received 4th April 1923.]

Owing to the conspicuous increase of chinch bugs [*Blissus leucopterus*, Say] in Indiana in 1921 a brief and popular account is given of the best farm practices in relation to their control and their destruction in hibernation quarters by burning. Other measures recommended are creosote bands and spraying [*R.A.E.*, A, x, 197].

MCINTIRE (M. H.). **Report of the Field Agent, Gipsy Moth Work.**—*20th Ann. Rept. Commissioner Agric. Maine, 1921*[–*22*], pp. 45–47. Augusta, Maine, 1922. [Received 4th April 1923.]

The work against the gipsy moth [*Porthetria dispar*, L.] has been continued along the usual lines, the chief methods employed being spraying and the use of parasites. Of the latter 121,000 *Anastatus* [*bifasciatus*], 1,666 *Blepharipa* [*scutellata*] and 25,000 *Apanteles* [*melanoscelus*] were liberated during the year.

KELSALL (A.). **Spraying and Dusting.**—*20th Ann. Rept. Commissioner Agric. Maine, 1921*[–*22*], pp. 105–117. Augusta, Maine, 1922. [Received 4th April 1923.]

The development of the use of insecticides and fungicides in Nova Scotia is briefly outlined, and the spray calendar now in use in that Province is given. The modifications of the sprays required for certain insects are also described.

McDONALD (R. E.). **Report of the Entomologist.**—*15th Ann. Rept. Commissioner Agric. Texas*, pp. 32–38. Austin, Texas, 1st November 1922. [Received 5th April 1923.]

At the beginning of the season 1921–22 the cotton boll weevil [*Anthonomus grandis*, Boh.] was very abundant throughout Texas, but owing to weather conditions the damage was less serious than had been anticipated. The sweet potato weevil [*Cylas formicarius*, F.] appears to have spread over the greater part of the State, and the inauguration of laws restricting both the interstate and intrastate movement of infested slips and tubers, etc., is recommended. The invasion of the sugar-cane growing sections of Texas by the sugar-cane borer [*Diatraea saccharalis*, F.] is increasing in importance ; the alfalfa Chalcid [*Bruchophagus funebris*, How.] caused less injury to lucerne than in the preceding year ; the cotton leaf worm [*Alabama argillacea*, Hb.] did considerable damage in some fields, though on the whole it was less injurious than usual, apparently owing to the activities of parasites.

WOODARD (J. S.). **Pecan Insects.**—*Texas Dept. Agric.*, Bull. 73, pp. 131–140, 7 figs. Austin, Texas, November–December 1922. [Received 5th April 1923.]

In this entomological section of a treatise on the cultivation of pecan in Texas, by J. H. Burkett, a brief account is given of the insect pests attacking this tree, their habits and remedial measures against them. In addition to the pests previously noticed [*R.A.E.*, A, vi, 226] the obscure scale [*Chrysomphalus obscurus*, Comst.] is dealt with. A lime-sulphur spray is not considered effective against it [*cf. R.A.E.*, A, x, 173], but satisfactory results have been obtained with miscible oil.

McDONALD (R. E.). **The Boll Weevil. A Review of the Methods of Control.**—*Texas Dept. Agric.*, Bull. 74, 21 pp., 1 map. Austin, Texas, January–February 1923.

There is no known successful method of eradicating the cotton boll weevil [*Anthonomus grandis*, Boh.]. The various practices adopted are reviewed, their efficacy depending on the region of the State in which they are employed and the prevailing weather conditions. The necessity for concerted community action with the adequate legislation that it requires is pointed out.

A map is appended showing the range of infestation in Texas in 1920–22.

In the introduction to this bulletin G. B. Terrell recommends the ploughing under of the green cotton stalks as early in the autumn as possible. Owing to the resulting lack of food, many of the weevils die before going into hibernation. This method has the further advantage of improving the soil for the next crop.

SCHOLL (E. E.). **Orcharding in Texas and Nursery Inspection.**—*Texas Dept. Agric.*, Bull. 72, 247 pp., 108 figs. Austin, Texas, September–October 1922. [Received 5th April 1923.]

This bulletin includes an extensive list of orchard pests arranged according to the part of the plant they attack, with descriptions of their appearance and habits and the injury they cause. Formulae and instructions are given for the preparation and application of various insecticides and fungicides, and the laws concerning nursery inspection and certification in Texas are also appended.

FITE (A. B.). **Six Years of the Life History Studies on the Codling Moth.** —*New Mexico Agric. Expt. Sta.*, Bull. 127, 183 pp., 15 figs. State College, N.M., June 1921. [Received 5th April 1923.]

A detailed account is given of the life-history of *Cydia* (*Carpocapsa*) *pomonella*, L., as observed from the spring of 1914 to the autumn of 1919 in New Mexico. There are four generations a year at an altitude of 3,820 feet, where the growing season is 193 days, but at higher altitudes there would probably be fewer generations.

The insect enemies recorded are small red ants, the larvae and adults of lacewing flies and of the Clerid, *Cymatodera aethiops*, Wolcott.

Service and Regulatory Announcements, July–December 1922.—*U.S. Dept. Agric.*, Fed. Hortic. Bd., no. 73, pp. 101–141. Washington, D.C., 3rd March 1923.

Recent revisions and amendments to existing quarantine orders of the United States are given verbatim and include Amendment No. 2 to Regulations Supplemental to Notice of Quarantine No. 37 [*R.A.E.*, A, xi, 95]; Amendment No. 1 to Notice of Quarantine No. 43 (2nd Revision) on account of *Pyrausta nubilalis*, Hb., and Amendments Nos. 1, 2, and 3 to the Regulations supplemental to this notice.

The Regulations supplemental to the Notice of Quarantine No. 13 on account of *Ceratitis capitata* (Mediterranean fruit fly) and *Dacus cucurbitae* (melon fly) in Hawaii have been revised, as from 1st December 1922. The purpose of this revision is to make more explicit the inspection requirements under this quarantine at ports of arrival in the United States.

BARBER (E. R.). U.S. Bur. Ent. **The Sugar-cane Mealy Bug and its Control in Louisiana.**—*Louisiana Agric. Expt. Sta.*, Bull. 185, 16 pp., 4 plates. Baton Rouge, La., January 1923.

Although *Pseudococcus calceolariae*, Mask., occurs in almost any part of the cane-growing area of Louisiana, it only becomes a serious pest when attended by the Argentine ant [*Iridomyrmex humilis*, Mayr]. The injury to sugar-cane is continuous from the time of planting or winrowing in the autumn to the time of harvest the following year. The relationship between the mealy-bug and the ant are discussed. The control of the latter automatically reduces the number of mealy-bugs to within the limits of biological control. A slow poison syrup [*R.A.E.*, A, viii, 285] is recommended against the ants, the best time for application being the autumn soon after the cane has been planted.

CRAIGHEAD (F. C.). **The Spruce Budworm Situation in New Brunswick.** —*62nd Ann. Rept. Crown Land Dept. New Brunswick for the Year ended 31st October 1922*, pp. 82–84, 1 plate. Fredericton, N.B., 1923.

Recent work in connection with the spruce budworm [*Tortrix fumiferana*, Clem.] in New Brunswick is reviewed [*R.A.E.*, A, x, 576]. A comparison of various forest types in which spruce and balsam occur indicates the necessity of securing pure spruce stands in the future, otherwise the softwoods must be grown under the protection of the hardwoods. Pines should be used on poor soils where spruce and balsam grow slowly, in which connection white pine [*Pinus strobus*] and jack pine [*Pinus banksiana*] are recommended as being immune from budworm attacks.

KEMPSKI (—). **Ueber Milbenschäden in Tee und Cinchona und die neuesten Mittel zu ihrer erfolgreichen Bekämpfung.** [Mite Injury to Tea and Cinchona and the latest Means for successful Control.] —*Tropenpflanzer,* xxvi, no. 2, pp. 53–55. Berlin, March–April 1923.

This article is a condensed review of the data secured by Bernard, Kerbosch, and Leefmans in the Dutch East Indies [*R.A.E.*, A, vii, 41; viii, 454] on the mites that infest tea and cinchona.

DUNLOP (W. R.). **Report on the Economic and Natural Features of British Honduras in relation to Agriculture, with Proposals for Development.**—F'scap, 32 pp., 1 map, 1 graph. London, Crown Agents for the Colonies [1922].

This report embodies a section dealing briefly with insect pests recorded during February to November 1920.

These include *Rhynchophorus palmarum*, L., breeding in dead and dying cohune palms [*Attalea cohune*], and also occurring in coconut palms though not a serious pest if the trees are protected from mechanical injury and are healthy and vigorous; termites, a Scolytid beetle and a locust, *Tropidacris* sp., on coconut palms; a grub boring in underground stems of bananas; probably a new species of *Tomaspis* and *Diatraea* sp., on sugar-cane; the corn ear worm [*Heliothis obsoleta*, F.] on maize, which should be controlled by dusting with a mixture of starch and arsenic; and weevils and Bruchids damaging stored maize, rice, and red kidney beans. Red-ring disease of coconuts is serious in places along the mainland coast, and particularly up the rivers. On some plantations it may cause a loss of 30 per cent. of trees as they come into bearing. Destruction of diseased trees should be enforced by law.

De Groote en de Kleine Narcisvlieg. [The Large and Small Narcissus Flies.]—*Verslag. & Meded. Plantenziekt. Dienst,* no. 29, 8 pp., 5 figs. Wageningen, March 1923.

In Holland the large narcissus fly, *Merodon equestris*, usually emerges from the ground about mid-May. The female lays perhaps 60–100 eggs (1–5 to a plant) on the leaves near the ground, on bulbs that are close to the surface, or in the ground itself. The larvae hatch in 1–5 days and enter the bulbs. They are full grown in October, when they are found in the upper part of the bulbs, in which the majority pass the winter, only a few migrating to the ground to pupate in autumn. As a rule pupation begins in the second half of March, usually above the bulbs at about an inch beneath the surface of the ground. Pupation in the bulb is exceptional. The pupal period lasts about 5 weeks. Injury is not visible until the year following that in which infestation began, so that infested bulbs are usually planted out. The fly also occurs on *Amaryllis, Galtonia, Scilla, Leucojum, Lilium, Habranthus, Vallota,* hyacinth and tulip. Originally a native of southern Europe, *M. equestris* requires fine, sunny weather at the flight period. As has been observed in England, a cold, wet May decreases the injury in the following spring.

All bulbs that are holed or feel soft, especially at the collar, should be removed. At the beginning of March, while the larvae are still in them, infested bulbs should be destroyed by being mixed with

quicklime and watered. The soil may be sifted in order to collect the pupae. In small plots of costly varieties the flies may be netted or the bulbs may be protected with gauze tents. Though poison-baits have not yet been tried, experiments might be made with sodium arsenite $\frac{1}{8}$ oz., dissolved in 7 pints of water to which 17 fl. oz. of treacle is then added.

The small narcissus fly, *Eumerus strigatus*, probably oviposits also on the base of the plant near the ground. Adults that emerge in September and October probably die in winter. Pupation generally takes place in the bulbs beneath the outer scales. The adults appear in May and June. *Amaryllis*, hyacinth, *Iris*, *Sprekelia*, *Ismene*, onions and shallots are also attacked. It is not certain whether the fly is able to attack absolutely healthy bulbs, and it seems probable that eggs are laid close to a patch of rotten tissue. As the larvae occur between the outer scales the infestation may pass unobserved even in bulbs carefully selected for export. The measures advocated against *M. equestris* are equally effective against *E. strigatus*.

Vogelcultuur en Vogelstudie 1922. [The Encouragement and Study of Birds.]—*Verslag. & Meded. Plantenziekt. Dienst*, no. 30, 28 pp., 11 graphs. Wageningen, March 1923.

This is the report of the work done in 1922 by the bird protection branch of the Dutch Plant Protection Service [*R.A.E.*, A, ix, 476].

LEBEDEV (F. N.). **Как живет и питается Азиатская Саранча.** [The Life and Feeding Habits of the Asiatic Locust.]—33 pp., 2 plates. Samara, **Н. К. З. Самарское Губернское Земельное Управление** [Nation. Commissariat Agric. Samara Govt. Administ.], 1923.

A detailed account is given of the feeding habits and the process of moulting of the various stages of the Asiatic locust [*Locusta migratoria* ph. *danica*, L.] under artificial conditions, which approached as nearly as possible those in nature.

Remedial measures should be directed against the immature stages, for which reason details are given of the time and amount of feeding occurring in each case. The habits are remarkably uniform. Movement including flight is related to the direction of the wind, the locusts moving against the wind at an angle of 30–40°. They are also greatly influenced by meteorological conditions, and even when sheltered from the rain and cold indoors, will become motionless and cease feeding during dull foggy weather.

Feeding is always most intense in the early morning before the dew has dried and immediately after rain if it is followed by bright, warm weather. Food that has just been wetted is always readily eaten. In some experiments the netting was sprayed with water instead of applying it to the food, in which case the locusts drank the water before feeding.

Their sense of smell is highly developed, hidden food containing honey proving more attractive than more accessible unsweetened food. Food sprayed with water that had been in contact with onions also proved attractive.

SHEMBEL (S. Yu). **Отчет о деятельности Астраханской станции защиты растений от вредителей за 1922 год. (С 1-го октября 1921 г. по 1-е октября 1922 г.)** [Report of the Astrakhan Plant Protection Station for 1922. (From 1st October 1921 to 1st October 1922).]—**Н.К.З. Астраханская Станция Защиты Растений от Вредителей** [*Nation. Commissariat Agric. Astrakhan Sta. Plant Protect.*], 12th Year, 40 pp. [Received 17th April 1923.]

The pests recorded during the period under review include *Anisoplia* spp., *Eurygaster* spp., and *Siphonaphis* (*Aphis*) *padi*, L., on barley; *Brachycolus noxius*, Mordv., on wheat; *Arctia spectabilis*, Tausch., on wheat, millet, mustard and lentils; *Plutella maculipennis*, Curt. (*cruciferarum*, Zell.), causing serious damage to mustard and cabbage; *Phyllotreta* spp. on Cruciferous plants; *Oria* (*Tapinostola*) *musculosa*, Hb., on wheat; *Calandra granaria*, L., and *C. oryzae*, L., in stored grain; *Sitotroga cerealella*, Oliv., in stored maize; *Gryllus desertus*, Pall.; *Opatrum sabulosum*, L.; *Laphygma* (*Caradrina*) *exigua*, Hb., on potatoes, millet and beet; *Euxoa* (*Agrotis*) *segetum*, Schiff., on maize; and *Homoeosoma nebulella*, Hb., on sunflowers.

Vegetable pests are *Eurydema ornatum*, L., *Brevicoryne* (*Aphis*) *brassicae*, L., *Pieris rapae*, L., *Barathra* (*Mamestra*) *brassicae*, L., and *Phytometra* (*Plusia*) *gamma*, L., on cabbages; *Gryllotalpa gryllotalpa*, L. (*vulgaris*, L.); *Aphis gossypii*, Glov., on cucumbers; *Tetranychus telarius*, L., on cucumbers, tomatos, egg plant (*Solanum melongena*), pumpkins, roses, lilac, etc.; *Hylemyia antiqua*, Mg., on onions; and *Aphis laburni*, Kalt. (?) on beans.

Pests of vines are *Polychrosis botrana*, Schiff., and *Eriophyes vitis*, Land.

Among fruit pests *Hyponomeuta malinellus*, Zell., *Biston hirtarius*, Hb., *Cydia* (*Carpocapsa*) *pomonella*, L., *Rhynchites auratus*, Scop., *Nygmia phaeorrhoea*, Don. (*Euproctis chrysorrhoea*, L.), *Anthonomus pomorum*, L., *Epicometis hirta*, Poda, and *Aphis pomi*, DeG., are recorded on apples; *Stephanitis* (*Tingis*) *pyri*, Geoff., on apples, pears, quinces and cherries; *Eulecanium* (*Lecanium*) *persicae*, Geoff., on old apple trees, peaches, *Robinia pseudacacia*, etc.; *Polyphylla alba*, Pall., on fruit trees; *Psylla pyricola*, Först., *Eriocampoides limacina*, Retz. (*Selandria adumbrata*, Klug), and *Eryophyes pyri*, Pagst., on pears; *Zeuzera pyrina*, L. (*aesculi*, L.); *Myzus cerasi*, F., on cherries; *Hyalopterus arundinis*, F. (*pruni*, F.), on peaches; *Eurytoma amygdali*, Enderl., on plums; *Rhopalosiphum ribis*, Buckton, on black currant; and *Porthetria* (*Ocneria*) *dispar*, L.

Locusta (*Pachytylus*) *migratoria*, L., occurred only in one locality and was not injurious to grain crops, though considerable damage was caused to late sowings of wheat and other grains by locusts coming from the Caucasus. *Tettigonia* (*Decticus*) *verrucivora*, L., was abundant during June.

REIKHARDT (A. N.). **Определитель нарывников и шпанок** (*Mylabris*, **F.**, *Epicauta*, **Redt.**), **паразитирующих в кубышках саранчевых (по Сумакову и Рейтеру).** [Key for the Determination of *Mylabris*, F., and *Epicauta*, Redt., parasitising the egg-masses of Locusts (after Sumakov and Reiter).]—**Петроградская Станция Защиты Растений от Вредителей** [*Petrograd Plant Protect. Sta.*], 24 pp. Petrograd, 1922.

This key, which is based on the work of Sumakov, "Palaearctic species of the genus *Mylabris*, F." (*Mem. Russ. Ent. Soc.*, xlii, no. 1, 1915) includes the species found in Russia, Caucasus, Siberia and Turkestan.

SAKHAROV (N.). **Сырная Муха, как вредитель соленыхъ рыбныхъ продуктовъ и мѣры борьбы съ нею.** [*Piophila casei*, L., as a pest of salted Fish Products and its Control.]—**Астраханская Станція по борьбѣ съ вредителями и болѣзнями растеній** [*Astrakhan Sta. Control Plant Pests and Diseases*], 1918, 35 pp. [Received 17th April 1923.]

The life-history and habits of *Piophila casei*, L., which infests salted fish in the Astrakhan region, are described, and recommendations for its control are made [*R.A.E.*, A, x, 91].

SAKHAROV (N.). **Къ біологіи бѣлаго хруща,** *Polyphylla alba*, **Pall.** [The Biology of *P. alba*.]—**Станція по борьбѣ съ вредителями и болѣзнями растеній** [*Astrakhan Sta. Control Plant Pests and Diseases*], 1918, 7 pp. [Received 17th April 1923.]

The Melolonthid, *Polyphylla alba*, Pall., is an important pest of gardens in the southern parts of Astrakhan. These observations were made during the flight year of 1915, the previous one having been recorded by Shreiner as occurring in 1910. Descriptions are given of the egg and of all the stages of the larva.

Adults were on the wing from 18th June to 15th July. The eggs are laid at a depth of from 5 to 10 inches, the female burrowing into the earth about the end of June. Each individual lays on an average 21 eggs, with a maximum of 41. The males are about ten times as numerous as the females. A mite was found attached to the adults, which it left as soon as the latter had deposited their eggs. This mite apparently feeds on the eggs without causing appreciable damage, and when the larvae hatch, it deposits its own eggs on them.

GRANDI (G.). **Gli Insetti dei Caprifichi.** [The Insects of Caprifigs.]—*Riv. Biologia*, v, no. 1, pp. 69–90, 15 figs. Rome, January-February 1923. [Received 5th April 1923.]

The natural history of fig insects is reviewed, *Blastophaga psenes*, L., and *Philotrypesis caricae*, L., being the species chiefly dealt with.

In the author's opinion *P. caricae* is a parasite of *B. psenes*. In captivity the females of the former can live for 15–25 days, whereas those of the latter die in 3 or 4 days. If inflorescences of caprifigs are isolated and only females of *P. caricae* are placed in them, all the receptacles fall, whereas if females of *B. psenes* (either alone or with *P. caricae*) are placed in them they develop in a normal manner. It is easy to find receptacles harbouring *B. psenes* only, but the author has never found *P. caricae* only. Further, the IDARNINAE hitherto studied by the author show such variation in individuals of a single species from the same source as would be improbable in an insect with a vegetable diet uniform in quantity and quality.

TRINCHIERI (G.). **I nemici delle piante forestali. Rassegna della letteratura fitopatologica internazionale. II.** [The Enemies of Forest Plants. A Review of International Phytopathological Literature. II.]—*Federazione pro Montibus*, Pubn. no. 10, 36 pp. Rome, 15th January 1923.

The papers noticed are those of 1921, and also such as were received up to June 1922. A previous booklet of the series has been issued [*R.A.E.*, A, xi, 101].

PIÉDALLU (A.). **Sur la destruction en grand des parasites des grains.**—*C.R. Acad. Agric. France*, ix, no. 12, pp. 364–368. Paris, 1923.

The results of two years' experiments in treating large quantities of wheat, oats, lentils and beans for insect infestation are described. The fumigants used were carbon tetrachloride and chloropicrin, only the latter being eventually employed. Details are given of four types of treatment: in a tent, in a small storehouse, in a large storehouse and in silos. The tent was of a capacity to cover nearly 20 tons of dry grain, and in this $4\frac{1}{2}$ lb. of chloropicrin was used and allowed to act for 48 hours. Four silos of about 90 tons capacity each were treated and two of about 150 tons; in the former one gallon of the fumigant was used and in the latter two gallons. About three weeks later the fumes were perceptible at the bottom of the silo. In all these experiments the cereals were freed from infestation and when ground showed a perfect product. Germination tests with grain from the larger silos showed 92, 95 and 98 per cent. germination.

A series of experiments was made with grain in a closed flask, using nearly six times the strength of chloropicrin necessary, and even under these conditions, after three weeks' fumigation, 75 and 78 per cent. of germination was obtained. The grain must be allowed thorough aëration, a trace of chloropicrin lowering the germination to about 56 or even 48 per cent.

La lutte contre le Doryphora.—*C.R. Acad. Agric. France*, ix, no. 12, pp. 359–363. Paris, 1923.

Further discussion is recorded regarding the best materials and manner of their use against *Leptinotarsa decemlineata*, Say (Colorado potato beetle) in France. Details are given of the relative merits of the plough and hand injectors of carbon bisulphide [*R.A.E.*, A, ii, 256]. Feytaud found in 1922 that one man in charge of a horse drawing a plough injector did the same work as five men working with the Excelsior type of hand injector. Thorough and repeated cultivation of the soil is beneficial in the winter, but is not of much use in the growing season and cannot be considered to replace treatment with carbon bisulphide as a measure for extermination. While flame throwers are not suitable for use in fields of ordinary dimensions, the torches used on vine stocks would be insufficient.

TROUVELOT (B.). **Le Doryphora** (*Leptinotarsa decemlineata*, **Say**).—*Rev. Hist. nat. appl.*, Ière Partie, iv, no. 2, pp. 51–57, 9 figs. Paris, February 1923.

An account is given of *Leptinotarsa decemlineata*, Say (Colorado potato beetle) and of its appearance in France and the measures that have been adopted to combat it.

The Colorado Potato Beetle.—*Jl. Minist. Agric.*, xxx, no. 1, pp. 59–62, 1 fig. London, April 1923.

The outbreak of *Leptinotarsa decemlineata*, Say, recently discovered in France in the vicinity of Bordeaux, over an area of about 100 sq. miles, has proved to be the most serious that has yet occurred in Europe. Every effort should be made to prevent a similar occurrence in Britain.

An account is given of the life-history of the beetle, and the ways in which it might be brought into Britain; and the importance of immediate notification of its occurrence is emphasised. It is the introduction of the adult beetles that is to be feared, since they can fly on to vessels or crawl into packages awaiting shipment, and on reaching port can fly for several miles in search of food. Spring or early summer is the most dangerous period, as a single female is then able to start an outbreak. On the other hand, beetles arriving in autumn are infertile, must wait until spring, and then the sexes must meet before breeding can take place, a coincidence that is evidently unlikely to occur. This pest is included among the insects scheduled under the Destructive Insects and Pests Order of 1922 [*R.A.E.*, A, x, 536; xi, 163].

Molz (E.). **External Factors affecting the Sex Ratio in Beet Nematodes.** —*Zentbl. Agr. Chem.*, l, no. 7, pp. 258–262, 1921. (Abstract in *Expt. Sta. Record*, xlviii, no. 3, pp. 245–246. Washington, D.C., March 1923.)

There is a considerable relative numerical increase of the females of *Heterodera schachtii* in beets that show a rank growth after being supplied abundantly with a fertiliser, particularly when it is nitrogenous in character. This leads finally in such soil to abnormally early and severe attack by the Nematodes, and the conditions that favour the increase of the ratio of females to males is discussed [*cf. R.A.E.*, A, x, 122]. These include moderate supplies of well-rotted horse manure or beet leaf compost. A relative increase of males followed reduction of the soil nutrients by more frequent planting of beets. Precocity and vigour of the plants favoured a relative large increase of females, as did also the increase of assimilating leaf surface.

Müller (H. C.) & Molz (E.). **Catch Plant Methods for combating Nematodes.**—*Zentbl. Agr. Chem.*, l, pp. 262–266, 1921. (Abstract in *Expt. Sta. Record*, xlviii, no. 3, p. 246. Washington, D.C., March 1923.)

The trap crop method of combating Nematodes has been modified by killing the trap plants with a corrosive liquid. The plan gave for the first year a considerable increase in the returns from beets. The crop was doubled in the case of oats and barley, though intensive green manuring and soil cultivation doubtless played a considerable part. Iron sulphate gave somewhat less favourable though still considerable results [*cf. R.A.E.*, A, ix, 387]. Barley, alternated with one beet crop and two following trap crops killed with 30 per cent. iron sulphate, gave about double the yield given by the controls. By this plan no year's crop is lost. The conclusion reached is that *Heterodera schachtii* can be effectively disposed of by this method without the trouble of ploughing.

Andrews (E. A.). **Factors affecting the Control of the Tea Mosquito Bug.** (*Helopeltis theivora*, **Waterh.**)—vi + 260 pp., 2 pl., 44 diagrams. London, Indian Tea Assoc. [1923.]

An account is given of the life-history of *Helopeltis theivora*, Waterh. (tea mosquito bug) and of the various factors that affect the growth of the bush and the incidence of the bug. In the author's opinion,

the chief hope for control lies in the production of immunity in the plant. The limitations of the spraying method are explained, and it is shown that, while spraying is of distinct value early in the season and on isolated bushes, it is not practicable on a large scale. The question of natural control by insects is not dealt with at any length, as no specific enemy has been found that offers any hope of success. The prevalent climatic conditions result in continuous wetting of soil that has received a preliminary soaking, and this produces somewhat waterlogged conditions and increasing soil acidity, conducing to greater liability to serious attack. The degree to which bushes of all kinds of tea suffer from the bug appears to depend largely on local soil variations, and is certainly not affected by the variety of the bush. The varying effects of shade trees in different places can be explained only by resulting changes in the soil, particularly as regards aëration brought about by differences in the development of the root system. This leads to a consideration of the importance of proper subsoil drainage. Cultivation is also an important factor in soil aëration; under the conditions prevailing over most of the area planted with tea in north-east India the danger is that continual cultivation will cause more harm than good. With regard to manuring, while nitrogenous manures should be used cautiously, lime and potash appear beneficial even in the case of bushes infested with the bug. The advantages of plucking and pruning are also discussed.

The following is an extract from the author's summary :—

"The remainder of the paper is devoted to an enquiry into the primary causes affecting the liability or otherwise of the bushes to attack. The enquiry opens with an examination of the soil of the three districts of North Bengal, the Surma Valley, and the Brahmaputra Valley, and it is found that there is a correlation between the ratio of available potash to available phosphoric acid, between the percentage availability of the phosphoric acid, between the value of the ratio of available potash to available phosphoric acid for a given percentage availability of phosphoric acid, and between the soil acidity of the soils of the three districts, and the varying degree in which the gardens situated in the three districts suffer from attack. No relation can be traced between the total quantities of potash and phosphoric acid present in the soil and the incidence of the pest. Manuring experiments with potash show that means calculated to increase the amount of available potash in the soil, based on the above observations, do indeed produce an effect in reducing the degree to which the bushes suffer from attack, but that this effect is transient, some factor which is in operation to cause the original shortage in available potash obtained by the plant intervening to prevent the continued absorption of the soluble potash supplied, for the results are transient both in light and heavy soils."

Corresponding immunity is also shown according to the increase in the proportion of potash compared with phosphoric acid in the leaf. It is evident that the composition of the leaf is controlled, not by the intrinsic chemical composition of the soil, but by some factor not shown by the present method of chemical analysis, so that a detailed enquiry into the dynamic changes going on in the soil throughout the season, which might cause the same soil to react differently according to circumstances, is very necessary.

The most important evidence in this enquiry is afforded by the fact that when a constant supply of soluble potash is applied to the roots

of the bush this substance is taken up, and bushes that suffer a serious infestation can be caused to throw it off entirely and remain immune from attack for the rest of the season, while experiments with the insect show that its vitality is directly controlled by the suitability or otherwise of its food supply. Since immunity does occur under field conditions and bushes vary from year to year in the degree to which they suffer from attack, and the presence of potash and phosphoric acid is distinctly a factor in producing immunity, the line of research obviously indicated is an enquiry into the behaviour of these substances in the soil under different conditions and into the factors influencing that behaviour, with the hope of discovering a practical means of dealing with *H. theivora* on a large scale.

SNYDER (T. E.). **A new *Reticulitermes* from the Orient.**—*Jl. Washington Acad. Sci.*, xiii, no. 6, pp. 107–109, 1 fig. Baltimore, Md., 19th March 1923.

Reticulitermes chinensis, sp. n., is described from China. The only other species of this genus known from the Orient are *R. speratus*, Kolbe, and *R. flaviceps*, Oshima, both from Japan.

JACK (H. W.) & SANDS (W. N.). **Cotton Experiments in Malaya.**—*Malayan Agric. Jl.*, x, no. 10–12, pp. 248–258. Kuala Lumpur, October–December 1922. [Received 10th April 1923.]

Provided that the time of planting is suitably chosen and the soil conditions are satisfactory, insect pests appear to be the chief factors that limit the yield of cotton in the coastal districts of Malaya. Those recorded are *Euproctis scintillans*, damaging the growing shoots and leaves; *Sylepta derogata*, against which dusting or spraying with Paris green or lead arsenate is recommended; *Earias insulana*, capable of causing extensive damage and against which a close season, during which old cotton plants are destroyed, should be enforced; *Spodoptera pecten*; and the stainer, *Dysdercus cingulatus*. The latter is an important pest and difficult to control owing to its numerous other food-plants, a list of which is given.

FROGGATT (W. W.). **Parasites of Olive Scale** (*Lecanium oleae*).—*Agric. Gaz. N.S.W.*, xxxiii, pt. 1, p. 56. Sydney, 1st January 1922.

Saissetia (*Lecanium*) *oleae* (olive scale) has ceased to be a serious pest in certain localities of Australia owing to the activities of insect enemies, both indigenous and imported. These are: the moth *Thalpochares coccophaga*; a Coccinellid, *Rhizobius* sp.; and the Chalcids, *Scutellista cyanea*, *Coccophagus orientalis*, *Aphycus lounsburyi*, and unidentified species, one of which was also bred from *S.* (*L.*) *filicum*, taken on ferns.

McCARTHY (T.). **The Grey Vine Curculio** (*Leptops tetraphysodes*).—*Agric. Gaz. N.S.W.*, xxxiii, pt. 1, p. 71. Sydney, 1st January 1922.

Although *Leptops tetraphysodes* (grey vine curculio) is probably widely distributed, it is recorded for the first time as a serious pest of vines in New South Wales. The weevils attack the young buds and completely destroy them. They cannot fly, and the larval stage is probably passed in the roots of the plant. A band of adhesive mixture about 2 in. wide, applied round the stem about 4 in. from the ground, should prevent the weevils ascending to the buds.

FROGGATT (J. L.). **The Banana Beetle Borer. IV.**—*Queensland Agric. Jl.*, xix, pt. 2, pp. 68–75, 3 plates, 6 tables. Brisbane, February 1923.

Further observations on the banana beetle borer [*Cosmopolites sordidus*] were carried out from August to December 1922, and it was found to occur in several parts previously thought to be uninfested. The rate of oviposition remained low throughout August, but showed a marked increase early in September and remained high till the middle of November. A considerable increase in the activities of the beetles in the field was noted early in September, as compared with the previous month, and this corroborates laboratory observations. These data appear to show that there are two periods in the year during which the activity of the beetles is greater than at other times, from March to the middle of May, and September to the middle of November, both inclusive. Their activity appears to be greater in the summer than in the winter months. Eggs laid in September matured in an average of 15 to 17 days, in October in 9·6 to 10·7 days, in November in 6·4 to 7·7 days, and in December in 6 days.

The larva reaches full development in from 55–60 days (eggs laid 4th–12th September 1922) to 27–33 days (eggs laid 3rd–6th November 1922). The dormant period lasts 2 or 3 days. With larvae pupating in September the pupal period was 12 to 14 days; early in October it had decreased to 8 to 11 days, and in November–December the average was 6 to 7 days. The full life-cycle from oviposition to adult emergence was 78 to 86 days for eggs laid 4th–12th September 1922, the period gradually decreasing to 41 to 44 days for those laid 3rd–6th November 1922.

The adults lie dormant for 6 to 7 days. Feeding on banana corms, they may live as long as 489 days. In moist or damp soil they will live without food for some time, but die rapidly under dry conditions. Corm baits poisoned with borax were found to be very effective if the beetles were exposed to the treated corm for long periods, but with shorter periods, such as would be normal in the field, they were not nearly so effective. No test has so far given results comparable with those obtained with either Paris green or sodium arsenite, used as dry powders [*R.A.E.*, A, xi, 64].

In no case have the adults been observed to fly or even to attempt to expand their wings. If they are exposed to heat and are unable to crawl away from it they roll on their backs and die in a few seconds. After 96 hours immersion in water, at room temperature, 90 per cent. of the beetles were alive, and remained so for 10 days, and therefore it does not seem likely that it would be practicable to kill them by immersing infested suckers in water. Paradichlorobenzene has a fatal or repellent effect on them in a confined space.

The most important factor in laying out a plantation is to start with clean suckers. Brief notes are given on the various stages of the weevil.

JARVIS (E.). **Cane Pest Combat and Control.**—*Queensland Agric. Jl.*, xix, pt. 2, pp. 86–87. Brisbane, February 1923.

Field experiments were started with paradichlorobenzene against cane grubs in November. Injections of ¼ oz. and ½ oz. were placed along one side of a row from 4 to 6 in. from the stools at a depth of 6 in. Six weeks later both treated and control stools had made equal growths. Injections of ¼ oz. and ½ oz. placed 4 in. from the stools

caused some of the outer leaves to wither and curl, and the odour of the fumigant had penetrated about 10 in. on all sides. Injections of ½ oz. placed 7 in. below the surface were found to have completely evaporated after 51 days, the rainfall during this period being very slight. [*cf. R.A.E.*, A, xi, 252.]

Natural Enemies of Sugar-cane Beetles in Queensland.—*Queensland Agric. Jl.*, xix, pt. 2, pp. 88–97 & 157, 5 plates. Brisbane, February 1923.

A series of coloured plates depicting some of the natural enemies of sugar-cane beetles in Queensland are given, the illustrations having been taken from a bulletin already noticed [*R.A.E.*, A, x, 615].

Tryon (H.). **Notes on the Citrus Orange Bug** (*Oncoscelis sulciventris*).—*Queensland Agric. Jl.*, xix, pt. 2, pp. 103–109. Brisbane, February 1923.

This is a preliminary report on investigations carried out on the citrus orange bug, *Oncoscelis sulciventris*, in January 1923. The insects present were nearly all in the adult state. They occurred principally in clusters of 2–10, rarely in larger numbers, and they attacked the tender shoots, which curled over and shrivelled up.

The eggs are laid side by side in a batch of about 14, usually on the lower surface of young leaves, and hatch in 8 or 9 days. The larvae remain and feed on the leaves, and if disturbed fall to the ground. Within a few days they pass to a second stage, when they disperse over the tree and cannot be shaken from it. On a single small orange tree 405 eggs were found and also some mature females. The removal of bugs by beating or tapping is not practicable, and clean trees are liable to be infested from without when general systematic cleansing is not undertaken. The insects are most readily detached from their food-plant in their first green stage and with the greatest difficulty during the second and nymphal (fifth) stage.

It has been suggested that *O. sulciventris*, being a native insect, has as its indigenous food-plants not only the wild *Citrus australis* and *C. australasica* but other species of Rutaceae also, and that each year it migrates from the orange groves in search of these wild food-plants, returning in the spring. It is, however, certain that it finds enough sustenance in the orange groves to enable it to increase yearly. So far it has not been observed on any native food-plants, but a closely related bug, *Stilidia indecora*, which is often confused with *O. sulciventris*, has been found. The bugs should be controlled when they appear in an orange grove or even on an isolated tree, and every infested tree should be regarded as a menace to uninfested ones in the next year.

Birds, including fowls, are the chief natural enemies. No egg parasites have been observed. *Asopus* sp. and an allied bug are predacious on *O. sulciventris*, but are of little significance. Remedial measures against the various stages are recorded. The eggs are difficult to destroy, as their shells are impervious to fluids. The first larval stage may be killed by any of the ordinary contact sprays, but their effectiveness diminishes as the bug grows older. Beating the trees should be done when the insect is in the early stages, and when brought down, the bugs should be prevented from returning to the trees by placing a band of grease-proof paper round each tree a few inches above the soil surface, grease being put on after it is in position. The need for co-operation against this pest is emphasised.

TRYON (H.). **A Destructive Beetle.**—*Queensland Agric. Jl.*, xix, pt. 2, pp. 155–156. Brisbane, February 1923.

Monolepta rosea is recorded as infesting cotton. It also damages many other plants, such as maize, lucerne, roses, dahlias and various fruit trees, and it occurs on native plants. The eggs are laid in the soil, and a single female may deposit about 50. There are at least two broods during the summer months. Spraying or dusting with Paris green or lead arsenate will kill the beetles, but much foliage destruction will result. Dense smoke only banishes them temporarily. The beetles are attracted to lights.

TRYON (H.). **Cotton Pests. Entomologist's Report.**—*Queensland Agric. Jl.*, xix, pt. 2, pp. 156–157. Brisbane, February 1923.

Cotton plants have recently been damaged by *Earias huegeli*. The caterpillar feeds on the pith of the young green wood, especially at the base of the shoots, and the second generation mines into the developing bolls and both penetrates the seed and cuts through the developing lint. The eggs are laid singly amongst the tender growth, and the resulting larvae gnaw into the soft tissue for about two weeks. All affected shoots should be cut out, and the plants should be burned and the ground ploughed after harvest. Another caterpillar, probably a species of *Pyroderces*, has been recorded as injuring cotton.

TRYON (H.). **Beetle (*Isodon puncticolle*) attacking Asters.**—*Queensland Agric. Jl.*, xix, pt. 2, p. 158. Brisbane, February 1923.

Isodon puncticolle is capable of gnawing through the stem-axis and larger roots of asters. Unsuccessful experiments have been made with trap lights. Manure used in dressing the soil before or after planting seems to attract the beetle. If this is so, the odour might be masked by some substance, especially one containing crude naphthaline.

ANDERSON (O. G.) & ROTH (F. C.). **Insecticides and Fungicides. Spraying and Dusting Equipment. A Laboratory Manual with Supplementary Text Material.**—8vo, xvi + 349 pp., 8 tables, 71 figs. New York, John Wiley & Sons, Inc.; London, Chapman & Hall, Ltd., 1923. Price 15s. net.

This manual is designed to offer instruction on the preparation of insecticides and fungicides, and on the selection, testing and operation of spraying and dusting equipment. It is primarily intended for collegiate use, and in a limited manner for those engaged in the practical and commercial phases of the horticultural industry. The chemical aspects are presented with as few technical terms as possible. The book also aims to show the relation and value of spraying as compared with other control measures, and to acquaint the reader, not only with a few standard measures, but with special ingredients, methods and equipment, and the reasons for a rise or decline in their usefulness. The importance of field-work in problems of pest control is emphasised.

Part I (pp. 1–174) comprises a series of 78 laboratory exercises grouped under such headings as stomach and contact (insect) poisons, fungicides, combination sprays, fumigants, spraying equipment, and problems of cost.

Spraying machinery and accessories, dusting and dusting outfits are discussed in detail in Part II, to which Prof. J. J. Davis contributes an outline of the entomological aspects of the subject; a chapter is devoted to the practical running of a gas engine; and included in the appendices are lists of (American) manufacturers of chemicals and equipment. Although written for the American student, covering as it does a field of such general importance, and one on which no text book has appeared in recent years, the work must be regarded as a distinct contribution to the literature of this subject. Readers are reminded that the U.S. liquid measure has been used throughout the book.

CRAIGHEAD (E. M.). **Life-history of, and Notes on, certain Chrysomelidae (Coleoptera).**—*Ent. News*, xxxiv, no. 4, pp. 118–121. Philadelphia, Pa., April 1923.

The species dealt with include *Monocesta coryli*, Say, found in August on foliage of slippery elm (*Ulmus fulva*), the larvae having completely defoliated the trees by the end of the month, and *Systena hudsonias*, Forst., on grape, both in Pennsylvania. The latter has a large number of food-plants, of which only the grape is of economic importance. The eggs are laid in July at the base of the plant or near to it, and hatch in about 8 days. Under laboratory conditions the larvae pupated on the surface of the soil, the pupal stage averaging 13·9 days. This beetle is very abundant in uncultivated fields and orchards and along fence rows, though the possibility of its becoming a serious pest of grapes is doubtful. Clean cultivation destroys a large number of the larvae.

RUSSELL (H. L.) & MORRISON (F. B.). **Annual Report of the Director.**—*Wisconsin Agric. Expt. Sta. 1921–22*, Bull. 352, 122 pp., 53 figs. Madison, Wis., February 1923.

In tests against the potato leafhopper [*Empoasca mali*], a plot sprayed with home-made Bordeaux with the addition of an arsenical produced 144 bushels an acre, nearly three times as much as the control plots. Efforts were made to keep the pressure at 200 lb., and 75–100 U.S. gals. of spray to an acre was applied.

Further data were collected on the effect of nicotine sulphate in dust carriers. First, second and third stage nymphs of the squash bug [*Anasa tristis*] were killed with 4–7 per cent., but fourth and fifth stage nymphs and adults are much more resistant, seldom more than 30 per cent. being killed, and the dusts have no effect on the eggs. If colonies consisting largely of nymphs in the first three stages are dusted early in the season, 95–99 per cent. are killed. The first three larval stages of the potato beetle [*Leptinotarsa decemlineata*] are readily killed with 5–10 per cent. nicotine sulphate combined with lime or copper sulphate and lime. The eggs are destroyed, and 60–80 per cent. of the fourth and fifth stage larvae are killed. In the case of the potato flea-beetle [*Epitrix cucumeris*] 1,600 individuals were all killed with 4–7 per cent.; 87–90 per cent. of the onion thrips [*Thrips tabaci*] were killed with 5–10 per cent.; 90–95 per cent. of the turnip aphis [*Aphis pseudobrassicae*] were killed with 5 per cent. when hand dusters were used, and 95–98 per cent. when the field was treated with power dusters; and 90 per cent. of the melon aphis [*A. gossypii*] were killed with 7 per cent. and all with 10 per cent.

Experimentally the striped cucumber beetle [*Diabrotica vittata*] may be controlled by two or three thorough applications of dust containing 10 per cent. nicotine sulphate (4 per cent. actual nicotine). The first application should be made early in June or as soon as the plants are attacked. A duster expelling the dust with force is necessary for effective work. The overwintered beetles die rapidly at the end of July, and the generation coming on at this time is a small one and does not increase till well into the autumn. There are two generations a year in Wisconsin, and in the year under review part of a third was obtained.

The pea aphis [*Acyrthosiphon pisi*] is one of the Aphids most resistant to nicotine. When power dusters were used, the percentage killed varied from 55–95 per cent., depending on the percentage of the nicotine in the dust, temperature and wind. Much better results were obtained when a large sheet of canvas was dragged over the peas behind the duster to keep the material from spreading.

A successful formula for grasshopper bait was 25 lb. sawdust (hardwood preferred), $1\frac{1}{4}$ lb. white arsenic, $1\frac{1}{4}$ lb. salt, 12 lb. amyl acetate, 5 lb. middlings and enough water to moisten, about 3 quarts. The sawdust, white arsenic and salt are mixed dry; the amyl acetate is added to the water and then mixed with the dry ingredients. After mixing, middlings are added and the whole stirred. This bait rapidly loses its effectiveness, and should therefore be applied immediately before the time of feeding.

Agrilus ruficollis (red-necked cane-borer) is one of the most troublesome pests of raspberries. The adults emerge from the canes at the end of May or early in June. The work of the larvae is recognised in late autumn and in winter and spring by the swellings or galls on the cane. The canes should be cut below the galls and burnt.

Fouts (R.). **Description of a new Serphoid Parasite (Hymen.).**—*Proc. Ent. Soc. Wash.*, xxv, no. 3, pp. 64–65, 1 fig. Washington, D.C., March 1923.

Inostemma leguminicolae, sp. n., was bred from *Perrisia* (*Dasyneura*) *leguminicola*, Lint., at Ithaca. The only other Platygasterid, *Platygaster leguminicolae*, Fouts, known to be parasitic on this midge, has a wide distribution, having been collected in Oregon and New York.

Gahan (A. B.). **An Eulophid Parasite of the Chrysanthemum Midge (Hymenoptera, Chalcidoidea).**—*Proc. Ent. Soc. Wash.*, xxv, no. 3, pp. 65–66. Washington, D.C., March 1923.

Tetrastichus diarthronomyiae, sp. n., was bred from *Diarthronomyia hypogaea*, Lw., at Baltimore.

Buchanan (L. L.). **The European** *Amalus haemorrhous*, **Hbst., in the United States (Curculionidae).**—*Proc. Ent. Soc. Wash.*, xxv, no. 3, p. 79. Washington, D.C., March 1923.

A brief description is given of *Amalus haemorrhous*, which was recently taken near Syracuse, N.Y. This weevil has been recorded by European writers as occurring on a heather, *Calluna vulgaris*, and as this plant is naturalised in the coastal region from Newfoundland to Rhode Island, it is not unlikely that it may become established over the same area.

BRIDWELL (J. C.). **The Host Plant and Habits of** *Acanthoscelides griseolus* **(Fall.) (Coleopt.).**—*Proc. Ent. Soc. Wash.*, xxv, no. 3, pp. 79–80. Washington, D.C., March 1923.

Among the plants producing a fibre of minor importance are some of the species of the leguminous genus *Sesbania*, one of which, *S. sesban*, is generally distributed in some of the southern States, Central America and the Hawaiian Islands. The seeds contain an oil that may ultimately prove commercially useful. The seeds are attacked in Hawaii by *Bruchus pruinosus* [*R.A.E.*, A, vi, 352]. The plant is infested in the Colorado Valley by *Bruchus* (*Acanthoscelides*) *griseolus*, which may become a serious pest if the oil in the seeds should ever warrant its cultivation. The females oviposit in the seeds, which remain in the pods for some time, and their entire contents are destroyed by a single larva, 50 per cent. of the material examined being thus affected. There was evidence of parasitism by Chalcids. This Bruchid is unknown from any locality other than the Colorado Valley where it is exposed to great extremes of heat and dryness, and no other food-plants are known.

The Insect Pest Survey Bulletin.—*U.S. Dept. Agric.*, iii, no. 1, 21 pp. multigraph. [Washington, D.C.,] 1923.

A review of the outstanding entomological features in Canada and the United States from November 1922 to March 1923 inclusive is given in this number. The European corn borer [*Pyrausta nubilalis*, Hb.] increased its area of infestation in Ontario during 1922. There was an outbreak of *Camnula pellucida*, Scudd. (roadside grasshopper) on the cattle ranges of the Nicola Valley in British Columbia in that year. In the Prairie Provinces the lesser migratory grasshopper [*Melanoplus atlantis*, Riley] has slightly increased in numbers. In southern Alberta the most important problem still remains the pale western cutworm [*Porosagrotis orthogonia*, Morr.]. The grape leafhopper, *Typhlocyba* (*Erythroneura*) *comes*, Say, was prevalent in Ontario, and other species were *T. tricincta*, Fitch, and *T. vulnerata*, Fitch. A severe outbreak of the rose chafer [*Macrodactylus subspinosus*, F.] occurred in Ontario. Judging from the egg masses of the forest tent caterpillar [*Malacosoma disstria*, Hb.] now present in New Brunswick there will probably be another outbreak of this moth, particularly over the southeast.

The mild weather has favoured the overwintering of the chinch bug, *Blissus leucopterus*, Say, and it is now found in threatening numbers over the greater part of southern and central Illinois, southern Nebraska and eastern Kansas. The green bug, *Toxoptera graminum*, Rond., is still widespread but is not at present considered to be a serious menace. There should be a much decreased spring emergence of the cotton boll weevil, *Anthonomus grandis*, Boh., in northern Louisiana, but reports from Alabama state that a high percentage has survived the winter successfully. The clover leaf weevil, *Hypera punctata*, F., is on the increase in Illinois, and heavy damage is anticipated. The fall canker worm, *Alsophila pometaria*, Harr., was emerging and ovipositing in serious numbers in New Jersey at the end of March. The San José scale, *Aspidiotus perniciosus*, Comst., is attracting increased attention in several States; lime-sulphur spray is not proving so satisfactory as usual, and some States are recommending lubricating-oil sprays. The first adult of the plum curculio, *Conotrachelus nenuphar*, Hbst., was observed in Georgia on 5th March so that the weevils will

probably appear in numbers from hibernation when the pear trees are in full bloom. The large numbers of hibernacula of the pecan case-bearer, *Acrobasis hebescella*, Hulst, that are present in the semi-arid pecan-growing sections of Texas seriously threaten the otherwise promising crop for 1923. The orange basketworm, *Platoeceticus gloveri*, Pack., is reported as causing serious damage to the fruit and young growth of several large plantations in Florida, in some cases as much as 20 per cent. of the fruit being damaged. The European red mite, *Paratetranychus pilosus*, C. & F., is now prevalent in fruit sections of New York, Connecticut and Ohio, and scattered infestations have been found in Maryland. Indications of a serious outbreak of the pea aphis, *Acyrthosiphon* (*Illinoia*) *pisi*, Kalt., in the San Francisco Bay region of California have been reported. The onion thrips, *Thrips tabaci*, Lind., is causing serious trouble in the melon growing section in California, and is now attacking the early vines under their frost protectors. The common field cricket, *Gryllus assimilis*, F., has seriously infested 200 acres of lettuce in California, and in some places the crop has had to be planted three times.

A detailed report of the various pests occurring in the period under review is given.

FLEBUT (A. J.). U.S. Bur. Ent. **The Achemon Sphinx Moth in California** (*Pholus achemon*, **Drury**).—*Mthly. Bull. Cal. Dept. Agric.*, xii, no. 1–2, pp. 12–33, 13 figs. Sacramento, Cal., January–February 1923.

Considerable injury has been caused to vines in California during 1922 by *Pholus achemon*, Drury. A detailed account is given of its life-history and habits [*cf. R.A.E.*, A, viii, 113].

There are two broods a year, the first in early June and the second in the latter part of July. Remedial measures must be applied before the larvae are full grown and should cover the entire infestation. A spray consisting of 5 lb. dry lead arsenate (10 lb. paste) and 1½–2 lb. casein spreader to 200 U.S. gals. water is recommended as being cheaper and simpler than the spray previously advocated.

WELDON (G. P.). **Spring Spraying of Peaches with Lime-sulphur.**—*Mthly. Bull. Cal. Dept. Agric.*, xii, no. 1–2, pp. 44–47. Sacramento, Cal., January–February 1923.

In recent experiments with lime-sulphur against *Anarsia lineatella* in California, the first application was made on 7th February with material tested 33° Bé. A second experiment was made 22nd March using 2 lb. dry lime-sulphur to 10 U.S. gals. water. Another experiment was made in March on another variety of peaches using liquid lime-sulphur 1–10. In all cases positive control was obtained, the early applications being equal in effect to the later ones. Lime-sulphur is preferable to lead arsenate under California conditions as it is less dangerous to the foliage and also controls leaf curl (*Exoascus deformans*).

Spraying should be done before the trees bloom, though very little injury is caused even when spraying at full bloom. This treatment also destroys many other pests, including *Bryobia praetiosa* (*pratensis*) and San José scale [*Aspidiotus perniciosus*]. It must not be used on apricots as they are subject to sulphur poisoning.

BENTLEY (G. M.). **Report of Inspections of Nurseries, Greenhouses, Strawberry Plant Fields, Foreign and Interstate Shipments of Nursery Stock and Sweet Potato Seed Plants for 1922.**—*Tennessee State Bd. Ent.*, Bull. 43, (xi, no. 4), 93 pp., numerous figs. Knoxville, Tenn., December 1922. [Received 17th April 1923.]

During 1922 the Mexican bean beetle [*Epilachna corrupta*, Muls.] spread to Tennessee and is now established in 51 counties.

An account is given of nursery inspections carried out during the year, and of the amended rules and regulations of the State Board of Entomology, with lists of the insects and fungous diseases declared to constitute infestation in trees and plants, and of the quarantine notices existing in Tennessee.

DURUZ (W. P.). **The Peach Twig Borer** (*Anarsia lineatella*, **Zeller**).—*Cal. Agric. Expt. Sta.*, Bull. 355, pp. 419–464, 18 figs. Berkeley, Cal., March 1923.

In central and northern California the larvae of *Anarsia lineatella*, Zell., hibernate from the beginning of September to the middle of March in chambers constructed in the crotches of the younger branches, rarely in branches more than three years old. Emergence in the spring is correlated with the sap flow of the tree; thus they appear to become active on almonds earlier than on peach or plum trees in the same locality. They eat their way down between the expanding leaves of the bud into the tips of the twigs. Each larva may attack several shoots, and three or four may completely destroy a young tree. The theory that the later emerging larvae of the first or winter generation attack the developing fruit has been disproved in the present extensive observations.

The larvae of the second and third generations feed on the fruit or twigs or both, those of the fourth generation do not feed at all but construct their hibernation quarters and form the first generation of the following season. Pupation occurs in old pruning wounds, curls of bark or rough crevices of the main trunk of the tree and occasionally in curled leaves. In the case of the first generation it lasts about 14 days, in the second only 2–4 days and in the third it varies from 7 to 20 days, apparently according to climatic conditions.

The adults of the first generation emerge between 1st and 15th May, the second in the beginning of August and the third about the first week in September. The first brood moths deposit their eggs on the twigs, the second on the fruit or twigs and the third apparently on the young branches near the crotches. Some of the larvae of the third generation apparently hibernate, while others attack the fruit; this has been substantiated by other workers in California as well as in Washington and Oregon.

During the winter of 1921–22 a Hymenopterous parasite, *Hyperteles (Oxymorpha) lividus*, Ashm., was found destroying from 70 to 95 per cent. of the immature larvae in many orchards.

The mite, *Pediculoides ventricosus*, and the Chalcid, *Copidosoma variegatum*, have been recorded from California by others but were not found by the author.

Various materials have been tested for the control of *A. lineatella*. Lime-sulphur was uniformly effective in twig infestation at all stages. Dry lime-sulphur was inferior in all cases to liquid. Good results were obtained with nicotine sulphate, and arsenicals proved of particular

value during blooming. Oil sprays were not at all effective. The formulae recommended are: 1 gal. lime-sulphur to 9 of water, with the addition of 3 lb. basic lead arsenate powder to 100 U.S. gals., applied just previous to blossoming—on apricots Bordeaux mixture should be substituted for lime-sulphur; nicotine sulphate ¾ U.S. pt. with 3 lb. soap to 100 U.S. gals. water, to be used in isolated cases where diseases and other insects are not troublesome; and as a summer spray basic or neutral (never acid) lead arsenate at the rate of 3 lb. to 100 U.S. gals. water with ¾ lb. casein spreader, to be applied not less than two weeks before the fruit is picked.

Clean cultivation and burning of all material likely to harbour the larvae are essential.

STEARNS (L. A.) & HOUGH (W. S.). **Spreader Tests on Apple and Peaches.**—*Proc. 27th Ann. Meeting Virginia State Hortic. Soc., 6th–8th December 1922*, pp. 55–59. Charlottesville, Va., March 1923.

Experiments carried out in 1922 with the addition of flour paste and casein to the usual sprays against apple pests and the Oriental fruit moth [*Cydia molesta*, Busck] on peaches are described. Neither of these spreaders increased the efficacy of the spray.

HOUGH (W. S.). **Codling Moth Investigations.**—*Proc. 27th Ann. Meeting Virginia State Hortic. Soc., 6th–8th December 1922*, pp. 60–65. 3 figs. Charlottesville, Va., March 1923.

The losses due to codling moth [*Cydia pomonella*, L.] during 1919–1921 in Virginia are reviewed. The cause of the apparent failure of remedial measures is considered to be the result of inattention both as to best time for spraying and thoroughness of application.

To assist in timing the sprays rearing experiments have been made, from which a chart has been prepared to suit Virginia conditions.

BRUES (C. T.). **Some Hymenopterous Parasites of Lignicolous Itonididae.**—*Proc. Amer. Acad. Arts & Sci.*, lvii, no. 11, pp. 263–288, 2 plates, 2 figs. Boston, Mass., May 1922. [Received 18th April 1923.]

Among the new species dealt with is *Polymecus (Dolichotrypes) minor*, which was found ovipositing in a stump containing larvae of the Cecidomyiid, *Janetiella* sp., in British Guiana.

DE MEIJERE (J. C. H.). **Zur Kenntnis Javanischer Agromyzinen.** [Contribution to the knowledge of Agromyzids of Java.]—*Bijdr. Dierkunde*, xxii, pp. 17–24, 5 figs. Leiden, 1922.

New species of Agromyzids described from Java include *Melanagromyza dolichostigma* on *Glycine hispida, Phaseolus radiatus, P. calcaratus* and *P. vulgaris*; *M. weberi* on *Cajanus indicus* and *Flemingia* sp.; *M. decora* on *P. radiatus*; and *M. ricini*, the larvae of which destroy the young fruit of *Ricinus*.

Other Agromyzids from Java are *M. phaseoli*, Coq., on *Glycine hispida* and *Phaseolus* spp.; *M. sojae*, Zehntn., on *Phaseolus radiatus, Indigofera suffructicosa* and *Flemingia* sp.; and *M. theae*, Green, the larvae mining in the leaves of the tea plant.

DE BUSSY (L. P.). **Proeven met stoffen, die antrekkend, afstootend of schadelijk werken op de rupsen van** *Prodenia litura*, **Fb.** [Experiments with Substances attractive, repellent or injurious to the Larvae of *Prodenia litura*.]—*Bijdr. Dierkunde*, xxii, pp. 337–342. Leiden, 1922.

Since 1906 lead arsenate and Paris green have been generally used against the larvae of the Noctuids, *Heliothis obsoleta*, F., and *Prodenia litura*, F., attacking tobacco in Sumatra. They have the disadvantage of being quickly noticed by the larvae, which then feed on such parts of the leaves as are free from the poison. The author has examined many substances thought likely to prevent this repellent effect without interfering with the toxicity of the insecticides, and also possible substitutes for them, but none was found to be attractive, whereas several proved repellent and (in most cases) fatal as well. The latter cannot, however, be used in practice at present owing to their cost, toxicity to man, etc., but they merit further study. They comprise mixtures of flour with one of the following: 10 per cent. calomel, 10 and 2 per cent. cevadin [an alkaloid from sabadilla seed] 10 per cent. copper cyanide, 10 per cent. iodide of mercury, 20 and 10 per cent. lead chromate, 10 per cent. thiosinamin [a derivative of oil of mustard], and 10 per cent. veratrin [a mixture of alkaloids from sabadilla seed]. The ground, air-dried seeds of *Pachyrhizus angulatus* have the same effect. Mixtures of flour and 5 per cent. calomel, or 1 per cent. cevadin or 10 per cent. strychnine nitrate did not appear to have any repellent effect and proved rapidly fatal.

RIMSKY-KORSAKOV (M.). **Phytophage Schlupfwespen als Getreidefeinde in Russland.** [Phytophagous Chalcids as Cereal Pests in Russia.]—*Supplementa Entomologica*, no. 9, pp. 16–22, 4 figs. Berlin, 20th March 1923.

This is a résumé of the author's paper in Russian on Chalcids of the genus *Harmolita* (*Isosoma*) published in 1914 [*R.A.E.*, A, ii, 470].

BOGDANOV-KATKOV (N. N.). **Der Meerrettichblattkäfer,** *Phaedon cochleariae*, **F.** [The Horse Radish Leaf Beetle, *P. cochleariae*.] —*Supplementa Entomologica*, no. 9, pp. 23–36. Berlin, 20th March 1923.

The information given here has already been noticed from the original Russian sources [*R.A.E.*, A, ix, 350; x, 444].

FERNANDES (J. M.). **Combate á lagarta rosada nos Estados Unidos.** [Work against the Pink Bollworm in the United States.]—*Bol. Minist. Agric., Ind. e Comm.*, xi, no. 1, pp. 109–115. Rio de Janeiro, January–March 1922. [Received 17th April 1923.]

This is an account of the measures taken in the United States against *Platyedra gossypiella*, Saund.

DE AZEVEDO MARQUES (L. A.). **Gafanhoto nocivo á palmeira "** *Cocos nucifera*, **L." (Biologia do acridio** *Tropidacris cristata*, **L.)** [A Locust injurious to the Coconut. The biology of *T. cristata*.]—*Bol. Minist. Agric., Ind. e Comm.*, xi, no. 2, pp. 113–124, 7 pls. Rio de Janeiro, April–June 1922. [Received 17th April 1923.]

Hitherto very little has been known of the bionomics of *Tropidacris cristata*, L., one of the largest locusts found in South America and a

serious pest of the coconut in Brazil owing to its voracity, fecundity, and longevity. A detailed description is given of the adult and of the immature stages. The latter live on the leaves of their food-plants. The adults scatter, but do not make definite migrations. One individual lived 406 days (240 as an adult)—dying shortly after oviposition. The eggs are deposited at a depth of about 2 in., usually near the food-plants, and may be destroyed by ploughing or digging. Against the hoppers a contact spray of kerosene soap is recommended. The adults and nymphs are best dealt with by spraying with Paris green or lead arsenate, the latter being preferable as there is less risk of scorching.

LÜSTNER (G.). **Stärkere Blattnager-** (*Phytonomus*) **Schäden an Luzerne.** [Somewhat severe Injury to Lucerne by *Phytonomus*.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, iii, no. 3, pp. 18–19, 5 figs. Berlin, 1st March 1923.

In May and June 1922 damage was done to lucerne by *Hypera* (*Phytonomus*) *variabilis*, Hbst., the upper parts of the plants withering as a result of attack by the larvae. In some cases the leaves were skeletonised. Pupation occurred from 12th June onwards in a loose, white cocoon and the adult weevils, which are leaf-feeders also, were bred out on 21st June. According to Reh, *H. variabilis* attacks beans, cabbage, and raspberry, and the larva eats potato foliage.

FRIEDRICHS (G.) & KOCH (A.). **Der Rüsselkäfer** *Apion assimile* **Kirby als Gartenschädling.** [*A. assimile* as a Garden Pest.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, iii, no. 3, pp. 19–20. Berlin, 1st March 1923.

Great damage has been done in gardens in Westphalia by *Apion assimile*, Kirby. In one case this weevil appeared in July after heavy rains and attacked all garden plants, beans, carrots, and lettuce being chiefly infested, while cabbage, peas, and potatoes were less severely injured. Spraying with an arsenical, the undersides of the leaves being carefully treated, was of some benefit. The details of the life-history of *A. assimile* are still unknown. The weevils of this genus appear to hibernate as adults, and to feed during spring and summer on buds, blossoms, leaves and shoots, ovipositing in blossoms, stalks, and roots, which are mined by the larvae.

KOCH (A.) & GASOW (H.). **Ei und Eiablage des Eichenwicklers** (*Tortrix viridana*, **Linné**). [The Egg and Oviposition of *T. viridana*.]—*Nachrichtenbl. deutschen Pflanzenschutz dienst*, iii, no. 4, pp. 26–27, 1 fig. Berlin, 1st April 1923.

The eggs of *Tortrix viridana* are usually laid in pairs, one just overlapping the other, and are covered with a gummy substance. They are deposited on the branches and not on the leaves. Rough places and forks on the upper branches are usually chosen.

THOMPSON (W. R.). **Sur le déterminisme de l'apterisme chez un Ichneumonide parasite.** (*Pezomachus sericeus*, **Först.**)—*Bull. Soc. ent. France*, 1923, no. 3, pp. 40–42. Paris, 1923.

Male individuals of *Pezomachus sericeus*, Först., may be either apterous or alate. The cause of this dimorphism is not known, though

it most probably has some relation to the quantity and quality of the food supply. In these observations this Ichneumonid was reared from *Apanteles vitripennis*, Hal., a parasite of *Lymantria* (*Ocneria*) *dispar*, and from an ant, *Camponotus* sp.

Chappellier (A.). **Régime alimentaire des Corbeaux freux et " moyens de défense " des Insectes.**—*Bull. Soc. ent. France*, 1923, no. 4, pp. 73–75. Paris, 1923.

Rooks seem to be guided by sight when searching for their food, which includes some apparently unpalatable insects. Young nestlings have been found to contain *Carabus auratus*, L., and numerous individuals of *Eurygaster maura*, L.

Knechtel (W. K.). **Einige neue Thysanopteren aus Rumänien.** [New Thysanoptera from Rumania.]—*Bull. Sect. Sci. Acad. Roumaine*, viii, no. 5–6, pp. 71–6. Bucarest, 1922–1923.

The new species described are *Aeolothrips priesneri* and *Thrips euphorbiae* in flowers of *Euphorbia* ; *Taeniothrips albidicornis* on *Pyrus communis*, *Acer tataricum* and *Fagus* sp. ; and *Oxythrips cannabensis* in flowers of *Cannabis sativa.*

Brandes (E. W.). **Mechanics of Inoculation with Sugar-cane Mosaic by Insect Vectors.**—*Jl. Agric. Res.*, xxiii, no. 4, pp. 279–284, 2 plates. Washington, D.C., 27th January 1923.

The previous literature on the insect transmission of mosaic disease of sugar-cane is reviewed ; it shows *Aphis maidis* to be the vector, though *Peregrinus maidis* and *Carolinaia* sp. may also act as transmitters.

The present observations were made on *A. maidis*, *P. maidis*, and *Draeculacephala mollipes*. The latter was used for comparative purposes, to ascertain if possible whether structural or functional feeding phenomena might inhibit its ability to transmit the disease.

Details are given of the technique employed, and the mechanism of feeding of *A. maidis* is described. During this process a copious secretion is excreted at the end of the setae from the salivary glands. This secretion continues to pour from the tips of the setae, as the latter pass into the deeper tissues, and forms a sheath. The setae pass through the substomatal cavity, then through the mesophyll cells, either intercellulary or intracellulary, continuing between two cells of the starch sheath and finally into the phloem of the vascular bundle. During the whole process the copious secretion from the insect pours into the practically uninjured and rapidly growing tissues of the leaf. The phloem cells are rich in substances of known nutritive value for micro-organisms, and the secretion of the insect is considered to be unquestionably the medium by which the infective principle of mosaic disease is carried into the plant.

There is no indication that the phloem is especially sought during feeding in the case of *P. maidis* and *D. mollipes*, the evidence pointing more to the tracheae as the object of attack, though this point cannot be determined in the case of *D. mollipes*. There is nothing in the method of feeding of this species that would exclude it as a possible carrier. The relatively enormous setae are as large in diameter as the entire vascular bundles of the young leaves on which feeding occurs,

and all the cells are crushed or engulfed in their entirety, though there is some evidence of salivary excretion even in this large leafhopper. It would appear quite possible for this species to penetrate to the vascular bundles by mechanical pressure alone.

To produce the disease, the virus, a measurable quantity of which is necessary, must be introduced into rapidly growing tissues in the interior of the plant. Even in the much more easily communicated tobacco mosaic a wound (such as the crushing of trichomes) seems necessary.

These observations would appear to exclude from consideration previous theories of transmission such as the carrying into the plant of the scanty amount of virulent material adhering to the minute mouthparts, or the anal secretion or honey dew falling on the normally unwounded surface of the leaves.

SWEZEY (O. H.). **The Java Sugar Cane Leaf-mite in Hawaii.**—*Hawaiian Planters' Record*, xxvii, no. 1, pp. 4–7, 1 plate. Honolulu, January 1923.

During the summer of 1922 sugar-cane was severely infested by *Tetranychus exsiccator*, this being apparently the first record of such an outbreak in Hawaii. The mites were very numerous under the lower leaves, causing them to exhibit longitudinal yellowish stripes. Older infested leaves had become reddish in streaks, and still older ones were drying up and dying. The eggs are usually laid on the lower surface near the mid-rib, and the mites puncture the leaves and suck the juices. Where the cane had been thriving on account of favourable conditions, they apparently caused no special injury. Dusting had little if any effect on them. The principal natural enemy was an undetermined predacious mite larger than the leaf-mite, and others were a bug, *Stethorus vagans*, and a Staphylinid, possibly *Oligota* *?iformis*. It is probable that this infestation came from survivors from a ratoon crop previously on the field that had not been thoroughly burned after harvesting.

Paratetranychus viridis occurs on cane leaves in Porto Rico, causing similar damage, but it is only prevalent during drought.

SWEZEY (O. H.). **Mole Cricket Injury at the Manoa Substation.**—*Hawaiian Planters' Record*, xxvii, no. 1, pp. 38–39, 1 plate. Honolulu, January 1923.

In 1922 *Gryllotalpa africana* (mole cricket) injured seed cane by eating the eyes, gnawing the root-bands, and eating holes through the rind into the interior of the seeds. This is the first time that such extensive damage by mole crickets has been observed in Hawaii. Previous injury has been done chiefly to the canes that were lying on the ground in wet places, and occasionally by the crickets eating out eyes of recently planted cuttings. In Porto Rico the best measure against another species [*Scapteriscus vicinus*] has been planting the seeds with the leaf sheaths on and placing them in a slanting position so that one or more eyes are above the surface, afterwards earthing the plants up slightly when the new shoots are started. In various parts of the world Hymenopterous enemies of crickets occur, and a few have been imported from the Philippines [*R.A.E.*, A, x, 519], but apparently have not become established.

EHRHORN (E. M.). **Report of Chief Plant Inspector, October and November 1922.**—*Hawaiian Forester & Agriculturist*, xix, no. 12, pp. 284–287. Honolulu, December 1922.

The pests intercepted in October and November 1922 included: from California, *Pseudococcus maritimus* on pears, and scale-insects on roses; from China, *Parlatoria ziziphus* on pomelo; from Japan, *Lepidosaphes ficus* on sandpears [*Pyrus sinensis*]; and from New Zealand, *Trionymus phormii* on flax [*Phormium tenax*].

FULLAWAY (D. T.). **Report of the Entomologist.**—*Hawaii Bd. Agric. & Forestry*: *Rept. Bienn. period ended 31 Dec. 1922*, pp. 53–68, 3 figs., 1 col. plate. Honolulu, 1923.

Investigations were made during 1921 and 1922 into the possibilities connected with the introduction and colonisation of the insects associated with the caprification of the various species of *Ficus* growing in Hawaii. Shipments of fruiting plants were made from Hong Kong and British India and from the former 30 *Ceratosolen* sp. were liberated. While none of the much desired Oriental species of fig insects have been established, two from Australia [*Pleistodontes froggatti* and *P. imperialis*] that fertilise *Ficus macrophylla* and *F. rubiginosa* have been successfully colonised [*R.A.E.*, A, xi, 184].

Pineapple insect investigations were begun in 1921 after an outbreak of fruit beetles during the summer harvest, and were continued on account of the appearance of red spider on the Island of Oahu. Preliminary experiments demonstrated the ineffectiveness of fumigation, and tests were made of the value of insecticidal sprays, dusts and gases, for controlling mealybugs, scale-insects and red spider. The conclusion reached is that effective control cannot be expected from the use of artificial methods, even from repeated applications of insecticides. The importance of biological investigations is thus emphasised.

Attempts were made to secure enemies of mealybugs from Mexico, and the species imported thus far have been: *Allotropa* sp., *Gyranusa* spp., *Pseudaphycus* sp., *Curinus coeruleus*, and *Hyperaspis silvestri* and another Coccinellid, infesting *Pseudococcus nipae*; *Chrysoplatycerus* sp. and *Diomus* sp., infesting *P. calceolariae*; and *Pseudaphycus* sp., *Nephus* sp. and *Diomus* sp., infesting *P. bromeliae*.

In June 1922 species of the pewee lark, *Grallina picata*, were introduced from Australia against army worms. During 1922 the fern weevil [*Syagrius fulvitarsis*] was found in two new localities, which will be stocked with the parasite introduced from Australia [*Ischiogonus syagrii*]. The following parasites were liberated: *Tetrastichus giffardianus*, *Diachasma fullawayi*, *D. tryoni*, *Opius humilis*, *Dirhinus giffardi* and *Galesus silvestrii* against the fruit fly [*Ceratitis capitata*]; *O. fletcheri* against the melon fly [*Dacus cucurbitae*]; and *Paranagrus osborni* against the corn leaf-hopper [*Peregrinus maidis*].

MENDIOLA (N. B.) & CAPINPIN (J. M.). **Breeding Ornamental *Hibiscus*.**—*Philippine Agriculturist*, xi, no. 7, pp. 217–230, 2 plates. Los Baños, February 1923.

The scale, *Phenacoccus hirsutus*, Green, and *Nisotra gemella*, Erichs., and another undetermined beetle of this genus are pests of seedling *Hibiscus* in the Philippines. The flower buds, open petals, and tender leaves of the plant are attacked. Some of the varieties are fairly

resistant, and it is not known whether the native ones are attacked. *P. hirsutus* is said to be controlled by 7½ gals. kerosene, 2¼ lb. hard soap, and 4 gals. water. Other insects have been observed, some feeding on the leaves, but apparently they do no serious injury to the plant.

KUNHI KANNAN (K.). **The Sugar-cane Borer.**—*Mysore Agric. Calendar 1923*, pp. 9–16, 1 plate. Bangalore, 1923.

The most serious of the sugar-cane pests in India are the Lepidopterous larvae that bore into the growing shoots of the young cane. Usually 50 per cent. of the early shoots are thus damaged. There are several species of moths concerned, and their life-histories are all similar. Unsuccessful efforts have been made to control the caterpillars and destroy the eggs. The following remedy against the adults is recommended. As soon as the young shoots are out of the ground, small heaps of cane rubbish should be placed in the field, about 20 yards apart and in rows. The heaps should be gone over daily for two months. The adults will be found hiding underneath them in the day time and may be easily caught. These measures reduced an infestation from 50 to 2·5 per cent., whereas in an untreated cane field half the crop was lost.

CLEARE (L. D.). **Insect Notes.**—*Jl. Bd. Agric. British Guiana*, xvi, no. 1, pp. 40–41. Demerara, January 1923.

The Pentatomid bug, *Mormidea poecila*, Dall., has recently attacked rice by sucking the developing grain. It may be easily collected with hand nets. Larvae of *Brassolis sophorae*, L., have been found on sugar-cane, on which they had not previously been recorded. *Chalcis incerta*, Cress., *Spilochalcis brassolisis*, Schr., and an undetermined Sarcophagid have recently been recorded as parasites of this butterfly.

WARBURTON (C.). **Annual Report for 1922 of the Zoologist.**—*Jl. R. Agric. Soc. England*, lxxxiii, pp. 253–260. London, 1922. [Received 24th April 1923.]

The frit fly [*Oscinella frit*] was the most destructive pest of cereals during 1922, occurring on both spring and winter oats, and in one case on barley. A short account of its life-history is given. Experience of the year under review confirms the view that late-sown oats are most subject to attack and that early sowing and thick seeding appear to be the only possible measures against it.

Other pests of cereals are the wheat bulb-fly [*Hylemyia coarctata*]; wireworms; leather jackets [*Tipula*]; gout-fly on barley, of which *Chlorops limbata* was the species generally responsible in Kent; and Hessian fly [*Mayetiola destructor*] and corn sawfly [*Cephus pygmaeus*], which appeared to be more abundant than usual, though no complaints of important damage by them was received.

Among fruit pests certain weevils of the genera *Phyllobius* and *Otiorrhynchus* appear to be increasing in some districts, and Capsid bugs have been reported from fresh localities. In several instances *Tetranychus* spp. were found on gooseberries, currants, and strawberries, on which *Bryobia* spp. are more generally met with.

Pteromalus deplanatus has now been proved to be a parasite of the oak tortrix [*Tortrix viridana*]. Other forest pests are *Pemphigus bursarius* (leaf-stalk aphis) attacking poplar trees; *Rhabdophaga*

saliciperda (willow wood midge) causing a great deal of damage to willow stems and branches—in slight infestations the affected trees should be cut down to the ground level and burnt, but where large areas are attacked, the diseased patches should be painted in the spring with tar to prevent the emergence of the fly in May; *Sirex gigas*; beech coccus [*Cryptococcus fagi*]; and poplar longicorns [*Saperda*].

SPENCER (G. J.) & CRAWFORD (H. G.). **The European Corn Borer in Ontario.**—*Ontario Dept. Agric.*, Bull. 295, 11 pp., 10 figs. Guelph, Ont., March 1923.

The bionomics of *Pyrausta nubilalis*, Hb., and its distribution in Ontario are recorded. The measures advocated are the increased use of silos, the destruction and burning of all refuse maize stalks and cobs, the complete ploughing under of all refuse on the field, and the planting of the new crop as late as possible with a small trap crop as early as possible.

FROGGATT (W. W.). **Insect Pests of the Cultivated Cotton Plant, No. 3. Cotton Stainers and other Plant Bugs.**—*Agric. Gaz. N.S.W.*, xxxiv, pt. 3, pp. 209–212. Sydney, 1st March 1923.

A brief account is given of the species of *Dysdercus* and *Oxycarenus* that damage cotton in various parts of the world. In Australia *Nysius vinitor*, Bergr. (Rutherglen bug) is very common in the opening bolls and on the foliage. When it attacks ripening seeds, such as those of onion and carrot, it sucks all the moisture from them. On several occasions it has damaged ripening wheat, and in a time of drought it lives on prickly pear. The eggs are deposited on grass and herbage, so that clean cultivation must be practised. *Oxycarenus luctuosus*, Montrz. (coon bug) has a wide range far inland and is chiefly destructive to grass and herbage, on which the eggs are laid. The adults are nearly always found on odd cotton plants growing in gardens. *Dysdercus sidae*, Montrz. (red cotton bug) is widely distributed over New South Wales and Queensland, and in western scrub-lands it breeds on the trunks of *Geijera parvifolia*, and has frequently been found on cotton bolls. *Oncolpeltus quadriguttatus*, F. (parti-coloured cotton bug) has a wide range over New South Wales, and is very prolific.

FROGGATT (W. W.). **Damage by Fruit Beetles.**—*Agric. Gaz. N.S.W.*, xxxiv, pt. 3, p. 224. Sydney, 1st March 1923.

Carpophilus aterrimus is recorded as attacking peach, nectarine, and plum trees. The eggs are usually laid in decaying fruit, and the beetles nibble the surface of the fruit about the base of the stalk, causing the fruit to drop. Where fruit is open at the stalk, as in the case of certain varieties of peaches, the beetles make their way in and feed round the stone. All decaying matter should be cleared up, as eggs are laid in this and the larvae feed on it.

GAHAN (A. B.) & FAGAN (M. M.). U.S. Bur. Ent. **The Type Species of the Genera of Chalcidoidea or Chalcid-flies.**—*U.S. Nat. Mus.*, Bull. 124, 173 pp. Washington, D.C., 1923.

The contents of this paper are indicated by its title.

Yuasa (H.). **A Classification of the Larvae of the Tenthredinoidea.**—*Illinois Biol. Monogr.*, vii (1922), no. 4, pp. 325–490, 14 plates. Urbana, Ill., 1923.

This is an attempt to deal with the larvae of the Tenthredinoidea from the standpoint of synoptic, and, to some extent, of genetic classification.

Fracker (S. B.) & Vaughan (R. E.). **Control of Insects and Plant Diseases. A Spray Calendar.**—*Wisconsin State Dept. Agric.*, Bull. 36, 3rd Edn., 8 pp., 1 fig. Madison, Wis., February 1923.

The more common spray materials and their use are briefly described, and a spray schedule for apples, plums, and cherries is outlined.

Bondy (F. F.), Gaines (R. C.), Williams (W. B.) & Young (M. T.). **Dispersion of the Boll Weevil in 1922.**—*U.S. Dept. Agric.*, Dept. Circ. 266, 6 pp., 1 fig., 2 tables. Washington, D.C., 1923.

In 1922, 22,386 sq. miles of new territory were invaded by the cotton boll weevil [*Anthonomus grandis*], the greatest increase in infestation being in North Carolina with 16,363 sq. miles. In Texas and Oklahoma the infested area decreased by 8,944 sq. miles, thus leaving a net increase of 13,442 sq. miles for the Cotton Belt. Only 4 per cent. of the cotton crop is now produced outside weevil-infested territory.

Smulyan (M. T.). **The Barrier Factors in Gipsy Moth Tree-banding Material.**—*U.S. Dept. Agric.*, Bull. 1142, 15 pp. Washington, D.C., 30th March 1923.

The gipsy moth tree banding material, as manufactured at present, is composed of coal tar neutral oil, hard coal tar pitch, resin oil, and ordinary commercial hydrated lime.

Recent experiments have been carried out with this material against *Porthetria dispar*, L., to ascertain the chief factors determining its efficiency. Details of these tests show that the semiviscid or viscous condition of the material is the primary factor concerned and that the odour increases its efficacy. In actual contact it has a further irritating or burning effect on the larvae.

Substances with pungent odours, but lacking the viscous condition, were not effective as barriers. Although such odours apparently had some repellent action, this was overcome sooner or later by response to such stimuli as light and especially hunger.

These experiments carried out under artificial conditions are borne out as far as can be judged by observations in the field.

McKinney (H. H.) & Larrimer (W. H.). **Symptoms of Wheat Rosette compared with those produced by certain Insects.**—*U.S. Dept. Agric.*, Bull. 1137, 8 pp., 4 plates. Washington, D.C., 22nd March 1923.

Though all evidence shows that insects are not responsible for wheat rosette, this condition may be easily confused with the injuries produced by *Mayetiola* (*Phytophaga*) *destructor*, Say, *Harmolita grandis*, Riley (wheat straw worm), and *Meromyza americana*, Fitch (wheat stem maggot). To facilitate their recognition the similarity and the chief points of difference in the symptoms are described.

DE CAMPOS NOVAES (J.). **A praga dos cafezaes de Pedreiras é a** *Stenoma albella*, **Zeller.** [The Pest of Coffee Plantations in Pedreiras is *S. albella*.]—*Chacaras e Quintaes*, xxvii, no. 3, pp. 209–211, 2 figs. S. Paulo, 15th March 1923.

The Tineid moth that causes great damage to coffee in Pedreiras in the State of S. Paulo has been identified as *Stenoma albella*, Zell. This pest bores both into the tender twigs and the thick stems. A description of the larva, pupa, and adult is given. In view of the immense areas already destroyed no recommendation of measures is warranted until a really practical method can be evolved as the result of careful study.

DA COSTA MAIA (A.). **Pro combate ás sauvas. Impedindo o vôo dos Içás.** [To combat Ants. Preventing the Flight of the Winged Individuals.]—*Chacaras e Quintaes*, xxvii, no. 3, pp. 215–216. S. Paulo, 15th March 1923.

The winged ants swarm early in winter and emerge to form new colonies. The author states that if their escape is prevented by closing (and keeping closed) the exits made for them by the workers, they will die and the colony will speedily disappear.

MOREIRA (C.). **Insectos nocivos dos arrozaes e seu combate.** [Insects injurious to Rice-fields and their Control.]—*Almanak Agric. Brasileiro 1923*, pp. 193–194, 4 figs. S. Paulo, 1923.

The most harmful Coleopterous pests of rice in the Brazilian State of Minas Geraes are the Scarabaeids, *Podalgus humilis*, Burm. (also a pest of sugar-cane) and *Dyscinetus geminatus*, F. They live in the ground and are more abundant in summer than at other seasons. Both the larvae and adults injure rice and other tender-rooted plants. Carbon bisulphide is a most effective remedy, but the cost is prohibitive in view of the low price obtained for this crop, and flooding the rice-fields is the measure advised. In the State of Maranhão a Chrysomelid beetle, *Oediopalpa guérini*, Baly, has caused loss and a Pentatomid bug, *Mormidea poecila*, Dall., oviposits so abundantly on the foliage that more than 250 eggs have been counted on a square centimetre of leaf-surface, thus giving an idea of the injury that results from the sucking of the innumerable larvae. The collection and destruction of infested leaves bearing eggs is the best remedy. Another Pentatomid *Scaptocoris castaneus*, Perty, which occurs in Minas Geraes, lives in the ground and attacks the stalks. It should be dealt with by flooding wherever possible.

PESTANA (A. C.). **Uma nova e temivel praga dos feijões,** *Chalcodermus angulicollis*, **Fabr.** [A new and formidable Pest of Beans, *C. angulicollis*.]—*Almanak Agric. Brasileiro 1923*, pp. 241–250, 14 figs. S. Paulo, 1923.

The weevil, *Chalcodermus angulicollis*, F., is a serious pest of beans in some parts of the district of Campos, Brazil. In 1921 and 1922 the seeds were infested to the extent of 90 per cent. or more. The female deposits eggs singly in the green and tender pods in the early morning. When the day becomes hot, the beetles fall to the ground and remain

motionless in the shade. The larva feeds in the seed and pupates in the ground at a depth of less than 6 in. In one case the life-cycle lasted 27 days. It is advisable to grow a small test plot of beans before sowing large areas. Experiments with various Leguminosae showed that *Phaseolus lunatus, Canavalia ensiformis* and *Mucuna* are among those that are not attacked.

MOREIRA (C.). **Insectos nocivos ás hortaliças.** [Insects injurious to Kitchen-garden Plants.]—*Almanak Agric. Brasileiro 1923*, pp. 291–293, 1 fig. S. Paulo, 1923.

In Brazil *Pieris monuste*, L., is most injurious to cabbage and other Cruciferae. The eggs are deposited on the lower surface of the leaves and hatch in 4–5 days. A kerosene-soap emulsion is recommended against the caterpillars if the outbreak is a severe one. Otherwise collection of them suffices. Various Noctuid caterpillars also infest cabbages, etc., and may be collected at night, or killed with a poison-bait of wheat flour 25 lb., Paris green 1 lb., syrup 2 gals., and water 2-4 gals. The Aphid, *Brevicoryne brassicae*, L., is also recorded on cabbages.

REGNIER (R.). **De quelques grands ennemis du Pommier et de leurs Parasites.**—*Rev. Bot. app. & Agric. colon.*, iii, no. 19, pp. 169–185. Paris, 31st March 1923.

A general account is given of the insect pests of apples in France together with their predacious and parasitic enemies. The study of this subject has been very much neglected in the past, and though beneficial insects cannot be entirely relied upon for the destruction of certain pests, artificial measures should not be applied at the expense of biological ones, the increase of which should be encouraged.

Among the natural enemies recorded, *Ephedrus plagiator*, Nees, parasitises *Aphis pomi*, DeG. (*mali*, F.); *Anthocoris sylvestris*, L. (*nemorum*, L.) is predacious and *Pimpla pomorum*, Ratz., parasitic on *Anthonomus pomorum*, L.; *Herpestomus brunnicornis*, Gr., *Exochus gravipes*, Gr., *Anilastus ebeninus*, Gr., *Blaptocampus canaliculatus*, Ratz., *Chorinaeus tricarinatus*, Hlgr., *Apanteles tenebrosus*, Wsm., *Ageniaspis* (*Encyrtus*) *fuscicollis*, Dalm., *Pezomachus hortensis*, Gr., *Pteromalus variabilis*, Ratz., and *Dibrachys boucheanus*, Ratz., are parasites of *Hyponomeuta malinellus*, Z.; *Ichneumon similatorius*, F., *I. lineator*, F., *I. suspiciosus*, Wsm., *Casinaria moesta*, Gr., *Apanteles emarginatus*, Nees, *A. vitripennis*, Hal., *A. salebrosus*, *Meteorus vitripennis*, Hal., *M. pallidus*, Nees, *Angitia rufipes*, Gr., and *Sagaritis zonata*, Gr., parasitise various apple pests; *Casinaria nigripes*, Gr., *C. senicula*, Gr., *Sagaritis raptor*, Zett., and *Telenomus dalmani*, Ratz., parasitise *Notolophus* (*Orgyia*) *antiquus*, L.; *Stylocryptis brevis*, Gr., *Pristomerus vulnerator*, Pnz., *Perilampus laevifrons*, Dalm., and *Inostemma bosci*, Jur., parasitise *Cydia* (*Carpocapsa*) *pomonella*, L. (*pomonona*, Schiff.); *I. bosci* is also a parasite of *Perrisia* (*Cecidomyia*) *brassicae*, Wied.; and *Archenomus bicolor*, How., and *Azotus marchali*, Dalm., are parasites of *Aspidiotus ostreaeformis*, Curt. *Aphelinus mali* Hald., has recently been introduced into France for the destruction of *Eriosoma lanigerum*, Hausm. [*cf. R.A.E.*, A, ix, 593].

Some of these parasites are also hyperparasites, such as *Pezomachus hortensis* (parasite of *Microgaster*), and *Pteromalus variabilis* and *Dibrachys boucheanus* (hyperparasites of numerous Lepidoptera and especially *Phytometra* (*Plusia*) *gamma*, L.).

Other beneficial insects are Coccinellids, Syrphids and *Chrysopa vulgaris*, Wesm., which, however, have their own insect enemies, thus *C. vulgaris* is parasitised by the Ichneumonid, *Hemiteles aestivalis*, Gr., the Proctotrupid, *Helerus anomalipes*, Penz., the Braconid, *Microgaster perlea*, and the Chalcid, *Telenomus acrobates*, Giard. The larvae of *Syrphus ribesii*, L., and *S. balteatus*, DeG., are parasitised by the Chalcid, *Pachyneuron formosum*, Wlk., and the Proctotrupids, *Lygocerus syrphidarium*, Kieff., and *Trichosteresis syrphi*, Bch.; the adults are preyed upon by *Bembex oculata*, Latr., and Sphegids of the genus *Clytochrysus*.

Janini Janini (R.). **The Chief Diseases and Pests of the Orange and Lemon Groves of Spain.**—*Internat. Rev. Sci. & Pract. Agric.*, N.S., i, no. 1, pp. 61–73, 2 pls. Rome, January–March 1923.

Pests of oranges and lemons in Spain include *Otiorrhynchus meridionalis*, Schoenh., *Acrolepia citri*, Mill. & Rag., *Cryptoblabes* (*Albinia*) *gnidiella*, Mill, *Eupithecia pumilata*, Hb., *Ceratitis capitata*, Wied., and *Toxoptera aurantii*, Koch, and other Aphids. Coccid pests include *Chrysomphalus aonidum*, L. (*Aspidiotus ficus*, Comst.), *C.* (*A.*) *aurantii*, Mask., *Aspidiotus hederae*, Vall. (*limonii*, Sign.), *Diaspis monserrati*, Colvée, *D. colveei*, Penzig., *Lepidosaphes beckii*, Newm. (*Mytilaspis citricola*, Comst.), and *Chrysomphalus dictyospermi* var. *pinnulifera*, Mask. Among the Coccids associated with injurious fungi, the most important are *Coccus hesperidum*, L., *Saissetia oleae*, Bern., and *Pseudococcus citri*, Risso. Other species are *Parlatoria zizyphus*, Sign., *P. pergandei*, Comst., and *Ceroplastes rusci*, L. A few years ago *Icerya purchasi*, Mask., together with the predacious Coccinellid, *Novius cardinalis*, Muls., found its way into Badajoz from Portugal. Introduced in 1922 from France into eastern Spain, it does not seem to be sufficiently checked by *N. cardinalis*, colonies of which occur in that region. Some mites, *Rhizoglyphus* and *Tetranychus*, are often found injuring orange and lemon trees.

Hydrocyanic acid gas fumigation is employed against Coccids as well as liquid insecticides, some formulae for the latter being: Pine resin $15\frac{1}{2}$ lb., 62 per cent. caustic soda $6\frac{1}{4}$ lb., whale oil $2\frac{1}{3}$ lb., water 100 gals.; pine resin $33\frac{1}{4}$ lb., caustic soda $6\frac{2}{3}$ lb., water 100 gals; heavy tar oil 10 lb., fish-oil $13\frac{2}{5}$ lb., fish-oil soft-soap $16\frac{3}{4}$ lb., caustic soda of 95 per cent. purity 3 lb., water up to 97 gals. To prepare this last the soda and soap are dissolved with stirring in 4 gals. hot water. The tar oil is then added, followed by the fish oil. The whole is thoroughly mixed, and the water is finally added.

Malenotti (E.). **Le previsioni in entomologia agraria.** [Forecasts in Agricultural Entomology.]—Reprint, 6 pp., from *Il Coltivatore*, no. 3. Casale Monferrato, 30th January 1923.

The various factors involved in an outbreak of an insect pest are discussed, and it is concluded that no means of making accurate forecasts exists as yet.

MALENOTTI (E.). **Le stazioni invernali dell' *Anuraphis persicae-niger*, Smith.** [The Winter Quarters of *A. persicae-niger*.]—*R. Osserv. Fitopat. per Verona e Province limitrofe*, 3 pp., 1 fig. Avesa (Verona), 1923.

In view of the importance of *Anuraphis persicae-niger*, Smith [*R.A.E.*, A, xi, 30] as a pest of peach, and the scanty knowledge of its biology, the author examined the infested area on 23rd January 1923. Two important points ascertained were the great resistance possessed by this Aphid to cold, and the multiplicity of its winter quarters. Numerous colonies of healthy nymphs and females were found beneath the frozen surface of the ground, at depths between 2 and 10 inches. The numbers present were estimated at over 1,000 individuals on the roots of a 2-year-old peach tree. Hibernating individuals also occur in the crown beneath the dead leaves that remain shrivelled round the infested shoots and provide an excellent shelter. A third form of hibernation seen on the same plants, was that of the winter eggs; these were usually found in the folds of the cicatrices formed where lower branches had been pruned off. They also occur in the folds of the parchment paper used for grafts, but these also harbour small spiders that seem to destroy the eggs. Few batches of winter eggs were found, and they consisted of only 4–12 eggs each. The infested roots seem covered with a blackish, viscous substance, which consists of Aphid débris more or less decomposed. Search down to a depth of 24 inches showed that the roots that were most attacked were those of 2–20 millimetres diameter; the large roots of 12-year-old trees were not attacked. The subterranean quarters of the pest are therefore usually on young plants when the latter are close to larger trees infested in the crown. These facts suggest that young peach plants sent out from infested nurseries in winter are the most rapid means of spread.

Any attempt to combat this pest must include not only sprays for the aerial parts of the plants, but also repellents (soot, etc.) at the time of planting out. Furthermore, as it is probable that all the parthenogenetic forms are local migrants, sticky bands painted low down on the trunks will prevent ascent and descent. In the author's opinion no remedy is effective, and treatment should be restricted to trees in full bearing, the destruction of which would be too costly a measure. On his suggestion the Italian authorities propose to restrict dealing in infested young plants. In a footnote it is stated that experiments being conducted in April 1923, prove that apterous females hibernating on the roots produce young there in March.

CONTINI (E.). **Le tignuole della vite.** [The Vine Moths.]—*Riv. Agric.* xxviii, no. 16, pp. 247–249. Rome, 20th April 1923.

In Italy measures against the first generation of *Clysia ambiguella*, Hb., and *Polychrosis botrana*, Schiff., must be undertaken at the end of April or early in May, and against the second generation at the end of July. If the heat comes early and lasts long (which more especially occurs in Central and South Italy), there may be a third generation early in September that requires the same nicotine spray as the second generation. Pyrethrum, creoline, or petroleum may be used instead of nicotine. Lead arsenate is recommended against the first generation. The insecticides may be safely added to fungicide solutions.

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SAVASTANO (L.). **Della coltivazione dell'anona in Italia.** [On the Cultivation of *Anona cherimolia* in Italy.]—Reprint, 32 pp., 4 pls., from *Ann. R. Staz. speriment. Agrum. e Fruttic.*, vii. Acireale, 1923.

This paper urges the extensive cultivation in southern Italy of the custard apple, *Anona cherimolia*, which is the only subtropical tree that is fully acclimatised in Europe. *Pseudococcus citri*, Risso, has been recorded as a pest of this plant in Algeria, but the author has not yet noticed it in Italy. *Chrysomphalus dictyospermi*, Morg., has been found, but infestation by it is unimportant because the leaves on which this scale lives fall before it emerges in spring.

SAVASTANO (L.). **Condizione presente dei controparasiti ed insetticidi della biancarossa negli agrumi.** [The Present Condition of Parasitic Enemies and Insecticides in connection with *Chrysomphalus dictyospermi*.]—*Boll. R. Staz. speriment. Agrum. e Fruttic. Acireale*, no. 43, 5 pp. Acireale, February 1922. [Received 30th April 1923.]

This paper has been noticed from another source [*R.A.E.*, A, x, 517].

SAVASTANO (L.). **I capisaldi per una esatta irrorazione con la poltiglia solfocalcica contro la biancarossa.** [The Essentials for proper Spraying with Lime-Sulphur against *Chrysomphalus dictyospermi*.]—*Boll. R. Staz. speriment. Agrum. e Fruttic. Acireale*, no. 44, pp. 1–2. Acireale, 1922. [Received 30th April 1923.]

The main points needing attention if the best results are to be attained against *Chrysomphalus dictyospermi*, Morg., with lime-sulphur mixture [*R.A.E.*, A, ii, 412; iv, 158] are briefly recapitulated for the assistance of citrus growers.

Die Verwendung des Uraniagrün im Obst- und Weinbau. [The Use of Urania Green in Fruit and Vine Growing.]—*Landw. Ztg.*, iv, no. 7, pp. 77–78. Bozen, 1st April 1923.

Instructions are given for preparing and applying a spray containing Urania green against chewing insects attacking fruit trees and vines in South Tyrol, such as [*Cydia pomonella*, L.] and the vine moths [*Clysia ambiguella*, Hb., and *Polychrosis botrana*, Schiff.]. Stress is laid on the need for mixing lime with the arsenical in order to prevent scorching, newly slaked lime being the best for this purpose.

GUIGNON (J. H.). **L'*Aphelinus mali* parasite du Puceron lanigère (*Myzoxylus mali*, Hausm.)**—*Rev. Hist. nat. app.*, 1ère Partie, iv, no. 3, pp. 67–71. Paris, March 1923.

The Chalcid, *Aphelinus mali*, Hald., a parasite of *Eriosoma lanigerum*, Hausm. (*Myzoxylus mali*, Samll.) has recently been liberated in the Seine and Marne district, where it is hoped it will become established [*cf. R.A.E.*, A, ix, 593].

THEOBALD (F. V.). **Aphides on the Yellow Horned-poppy** (*Glaucium luteum*).—*Ent. Mo. Mag.*, lix, pp. 102–106, 4 figs. London, May 1923.

The Aphids described are *Cavariella glauciiphaga*, sp. n., *Myzus glaucii*, sp. n., *Anuraphis glauciifolia*, sp. n., and *Aphidella secreticauda*, gen. et sp. n., all from England.

CHAMPION (G. C.). **Note on *Trogoderma granarium* Everts (= *T. khapra*, Arrow) and *T. tricolor*, Arrow.**—*Ent. Mo. Mag.*, lix, p. 111. London, May 1923.

The author points out that *Trogoderma khapra*, Arrow, is a synonym of *T. granarium*, Everts, the latter name having been overlooked by recent writers. Specimens lately received for examination were found in imported wheat from Odessa and North America and in a brewery at Rotterdam.

T. tricolor, Arrow, has been found sparingly in imported ground-nuts (*Arachis*) in Holland and may be expected to occur in the same produce in England. The types are from Yemen, Arabia.

PRIESNER (H.). **Neue europäische Thysanopteren (ii).**—*Konowia*, ii, pt. 1–2, pp. 82–85. Vienna, 15th April 1923.

The new species described are: *Anaphothrips gracillimus* and *Thrips montivagus* from Austria; and *Haplothrips knechteli* from leaves of plum and *Fraxinus excelsior* in Rumania.

BRYCE (G.). **Experiments with the Green Muscardine Fungus on Rhinoceros Beetle Larvae.**—*Ceylon Dept. Agric.*, Bull. 65, 7 pp. Peradeniya, February 1923.

Previous attempts to control various insect pests by artificial dissemination of *Metarrhizium anisopliae* (green muscardine fungus) are reviewed, and experiments are described in which its action on the rhinoceros beetle, *Oryctes rhinoceros*, has been observed. From the time of inoculation of larvae to the development of the fungus periods varying from 39 to 81 days have elapsed. Some larvae, after three inoculations, were still living 54 days after the first inoculation. Apparently the fungus only attacks larvae that have been in captivity until their vitality is impaired, and it is obvious that the disease will only occur when conditions favour the fungus and are unfavourable to the insect. Its use against *O. rhinoceros* is therefore not advised.

WOLCOTT (G. N.). **Annual Report of the Division of Entomology.**—*Ann. Rept. Insular Expt. Sta. Rio Piedras, Porto Rico, 1920–21*, pp. 47–49. S. Juan, P.R., 1921. [Received 1st May 1923.]

In experimental transmission of mosaic disease of sugar-cane by insects living normally on this crop, 1·5 per cent. of the plants were infected by *Stenocranus* (*Saccharosydne*) *saccharivorus*, Westw. (cane fly), 2 per cent. by *Sipha flava*, Forbes (yellow aphis), 6·6 per cent. by *Pulvinaria iceryi*, Guér., 2·4 per cent. by *Pseudococcus* spp. (mealy-bugs) and 3·4 per cent. by *Paratetranychus viridis*, Banks (green red-spider). In some cases a higher percentage of healthy plants became diseased when the insects placed on them were taken from healthy plants as a control.

It has been found that there is no marked difference in the rapidity of spread of mosaic in young plant and young ratoon cane, whereas *Kolla similis*, Wlk., which was at first thought to be the transmitting agent, is twenty times as abundant on young plant cane, and, as it has not transferred the disease in any cage experiment, it may be practically eliminated from consideration.

Banana pests include *Lachnosterna* spp. (white grubs), the larvae of which feed on the roots and the adults on the leaves, larvae of the

weevil, *Metamasius hemipterus*, L., which have been found in the stem, stunting the growth and preventing fruit production, and various insects that eat the rotting tissues, such as *Ataenius stercorator*, F., and a weevil of the genus *Dryotribus*.

The coffee pests have been recorded elsewhere [*R.A.E.*, A, xi, 230]; a Chalcid of the genus *Tetrastichus* has been recorded from the eggs of *Lachnopus* [*coffeae*, Mshl.]. The tree cricket, *Orocharis vaginalis*, Sauss., attacks the leaves of both coffee and grapefruit.

The most important insect of the year was *Phthorimaea operculella*, Zell. (tobacco split worm), which is becoming a very serious pest of tobacco, and also feeds on potato tubers and egg plants.

Ainslie (G. G.). U.S. Bur. Ent. **A Corn-feeding Geometrid, *Pleuroprucha insulsaria*, Guen. (Lep. Geometridae).**—*Ohio Jl. Sci.*, xxiii, no. 2, pp. 89–101, 1 map. Columbus, Ohio, March–April, 1923.

Maize silk has been damaged in varying degrees during the last few years by the Geometrid, *Pleuroprucha insulsaria*, Guen., which is recorded from many of the eastern and southern States. Though fresh maize silk is undoubtedly the favourite food, many weeds are also attacked, and larvae have been reared to maturity on flowers of smartweed (*Polygonum pennsylvanicum*). In the spring the individuals that have survived the winter become active, the larvae maintaining themselves on the flower tissues of various plants until maize silk is available, when the numbers increase rapidly. The silk persists long enough for two generations to develop, and with its disappearance the species is again reduced to negligible proportions. The average life-cycle in midsummer, when food is abundant, is about 24 days. Apparently the only damage the larvae can do is to cut off the silk before fertilisation of the ovules has taken place, but pollination is generally accomplished so soon after the appearance of the silk that injury from this cause is unlikely.

The various stages of the moth are described and its habits discussed. The only parasite observed was *Apanteles nemoriae*, Ashm., which also infests other Geometrids and does not apparently destroy more than ten per cent. of the larvae at any time. These parasites are themselves parasitised by *Mesochorus* sp., which attacks its host while the latter is within the body of the caterpillar. Predacious enemies include the larvae of the Telephorid beetle, *Chauliognathus pennsylvanicus*, DeG., and of the Noctuid, *Heliothis obsoleta*, F.

The Gipsy Moth: An imminent Menace to the Forest and Shade Trees of the State of New York. Present Status of the Gipsy Moth situation and discussions at a Conference held in Albany, November 16th 1922, also Copy of Resolutions adopted in Relation to European Corn Borer.—*New York State Dept. Farms & Markets*, Bull. 148, 58 pp., 6 plates. Albany, N.Y., December 1922. [Received 2nd May 1923.]

The discussion recorded in this bulletin summarises the more important facts in relation to the gipsy moth situation. A history of *Porthetria dispar*, L., and of the problem of its control is contributed by Dr. E. P. Felt, and the plans and data considered at the conference are given. A resolution was passed urging the advisability of sufficient appropriations being obtained by the States interested and the Federal Government for the purpose of continuing and strengthening control

methods in infested areas, eradicating the New Jersey infestation, doing the necessary scouting for the discovery and destruction of border infestations, determining the most practicable place for a control zone and taking the necessary steps to make control therein effective, and destroying all infestations in and west of the said zone. It was also suggested that a line of defence consisting of a 20 or 25-mile strip, thoroughly scouted and kept clear of infestation, should be located in the Hudson Valley to stop the westward spread of the moth, and the route for such a line was traced.

As a result of the discussion of problems relating to the European corn borer [*Pyrausta nubilalis*, Hb.] it was resolved that, while the efforts made by the State, Federal and Canadian authorities to control the borer are approved of, the marked increase of the infestation in certain areas causes serious anxiety; the need for practical methods of dealing with extensive weed infestations in suburban and market garden areas was emphasised.

COTTON (R. T.). U.S. Bur. Ent. *Aplastomorpha vandinei*, **Tucker, an important Parasite of** *Sitophilus oryzae*, **L.**—*Jl. Agric. Res.*, xxiii, no. 7, pp. 549–556, 1 plate. Washington, D.C., 17th February 1923.

The Chalcid, *Aplastomorpha vandinei*, Tucker, is the most effective insect enemy of the rice weevil, *Calandra* (*Sitophilus*) *oryzae*, L., and is also an important parasite of *C.* (*S.*) *granaria*, L., *Bruchus quadrimaculatus*, F., *Lasioderma serricorne*, F., *Pachymerus* sp. and *Caulophilus latinasus*, Say. The stages of this parasite are described, and its life-history recorded.

Any stage of *C. oryzae* is attacked, though the larva appears to be preferred. Oviposition begins a day or two after emergence and has been observed to last from 39 to 73 days, 1–12 eggs a day being laid in the summer months, but only 1 or 2 daily in winter. On cold days oviposition ceases entirely. The total number of eggs laid by one female varied from 51 to 283. The incubation period lasts about $1\frac{1}{2}$ to 2 days during warm months and may take as long as 5 days in winter. The parasitic grub feeds rapidly and in summer becomes full-grown in 3 to 5 days. Pupation lasts 6 or 7 days in summer and sometimes as long as 30 days in winter. Of reared individuals, 60 per cent. were males. Unfertilised females laid eggs that gave rise to males only. Females lived in captivity for about 82 days, while males averaged 47 days.

Thus the parasite lays fully as many eggs a day as *C. oryzae* and completes its life-cycle in a little less than half the time required by its host. A smaller percentage of females is produced by the parasite, however, and several eggs may be wasted on one host larva, so that the rate of multiplication is less than that of the rice weevil and complete control is not obtained.

Report of the Director.—*41st Ann. Rept. Ohio Agric. Exp. Sta. 1921–22*, Bull. 362, pp. xxix–xxxv. Wooster, Ohio, June 1922. [Received 2nd May 1923.]

The work against the Hessian fly [*Mayetiola destructor*, Say] has already been described [*R.A.E.*, A, ix, 544]. The European corn borer [*Pyrausta nubilalis*, Hb.] has been found in several additional townships but has not yet done any commercial damage. Against *Paratetranychus pilosus*, C. & F. (European red mite), which was very

abundant locally, miscible oil applied in the spring was effective in destroying the overwintering eggs, but lime-sulphur had little beneficial effect.

An account is given of the successful use of aeroplanes for dusting against the catalpa sphinx [*Ceratomia catalpae*, Bdv.] [*R.A.E.*, A, x, 277].

CHITTENDEN (F. H.). U.S. Bur. Ent. **The Cocklebur Billbug.**—*Canad. Ent.*, liv, no. 10, pp. 217–220, 2 figs. Orillia, Ont. October 1922. [Received 2nd May 1923.]

A brief description is given of *Rhodobaenus tredecimpunctatus*, Ill. (cocklebur billbug), which for several years past has infested the stems of cultivated sunflowers. This weevil is widely distributed in the southern United States and is common in Mexico and Central America. It breeds in the stems of various wild plants, chiefly Compositae, and a list is given of its known food-plants. Its occurrence on sugar-beet is exceptional. It is frequently associated with other insects, notably *Languria mozardi*, Latr. (clover stem-borer). The hibernated adults appear in the district of Columbia early in May, and it is thought that eggs are deposited in holes that the female cuts in the stems while they are still young and tender. The larvae bore through the pith, and when mature, form a cell and pupate. Newly emerged adults occur from the middle of August till the first week in September. The parasites observed are *Habrocytus rhodobaeni*, Ashm., reared from the larvae, and another, undescribed, Chalcid.

DAVIS (J. J.). **The Relation of the Honeybee to Agriculture.**—*Amer. Bee Jl.*, pp. 120–122, 3 figs. Hamilton, Ill., March 1923.

The importance of bees in cross fertilisation of flowers, and the advisability of keeping them in orchards is explained. As bees are very susceptible to arsenical poisoning, trees should not be sprayed during blossoming time if there are bees in the orchard.

DAVIS (J. J.). **The San José Scale.**—*Purdue Univ. Dept. Agric. Extens.*, Bull. 114, 12 pp., 4 figs. LaFayette, Ind., February 1923.

The San José scale [*Aspidiotus perniciosus*, Comst.] is becoming an increasing menace to fruit-growers in Indiana, largely owing to favourable weather conditions and laxity in spraying. It has been suggested that a strain is being developed that is resistant to the lime-sulphur spray; there is no evidence to support this theory, but it is probable that the continued use of lime-sulphur has increased the percentage of individuals that are immune from its action [*cf. R.A.E.* A, xi, 80]. The life-history and habits of the scale are described. Certain orchard practices that will reduce its numbers include the removal of any isolated and heavily infested branches and the scraping of scaly bark. Dormant sprays of lime-sulphur or miscible oil are recommended, and the relative merits of each are discussed. For ordinary conditions lime-sulphur, either commercial liquid concentrate 1 : 8 or the home-made kind, is recommended, a standard miscible oil, diluted to about 1 : 15, being preferable when the scale is abundant and increasing. Oil sprays, however, should not be used for peach trees, as they are more susceptible to injury than apple.

A new lubricating oil emulsion is being tried, and has given good results, though it cannot yet be definitely recommended. It consists of 4 lb. liquid potash fish-oil soap, with 4 U.S. gals. of some oil such as Diamond paraffin, Red Engine or Nabob, with 2 U.S. gals. of soft water. With 200 U.S. gals. water this makes a 2 per cent. emulsion. The indications are that this is effective against young scales in summer as well as for overwintering immature scales, and that it can be combined with Bordeaux mixture and lead arsenate without injuring the effectiveness of any of the ingredients. Where the dormant spray has not entirely cleared the infestation, this oil spray should be applied when the first generation of young scales is developing.

Shitz (V. M.). **Вредители из Мира насекомых. (Общедоступные беседы).** [Pests from the Insect World (Popular Talks).]—8vo, 93 pp., 92 figs. Prague, Y.M.C.A. Press Ltd., American Pubn., 1923.

The object of this publication is to stimulate interest in the study of injurious insects. A general account is given of the classification of insects into orders, and the more common pests are briefly described divided into those attacking man and animals or injuring crops, forests, etc. General remedial measures are also quoted.

Uvarov (B. P.). **Новейшие данные иностранной литературы по технике борьбы с саранчевыми.** [The latest Information in Foreign Literature on the Control of Locusts.]—**Изв. Отд. Прикладной Энтом.** [*Rept. Bur. App. Ent.*], ii, pp. 1–12, 4 figs. Petrograd, 1922. [Received 3rd May 1923.]

This paper has already been noticed from another source [*R.A.E.* A, x, 429].

Vasilev (I. V.). **Новый вид трипса из рода** *Cryptothrips*. [A new Species of *Cryptothrips*.]—**Изв. Отд. Прикладной Энтом.** [*Rept. Bur. App. Ent.*], ii, pp. 13–15, 4 figs. Petrograd, 1922. [Received 3rd May 1923.]

Cryptothrips ovivorus, sp. n., is described from Fergana (Asiatic Russia) and Kharkov as destroying the eggs of *Cydia pomonella*, *Stephanitis* (*Tingis*) *pyri* and *Aspidiotus ostreaeformis*.

Vasilev (I. V.). **К вопросу о зимовке бахчевой (тыквенной) тли (*Aphis gossypii*, Glov.) на юге России.** [On the Question of the Hibernation of *A. gossypii*, Glov., in South Russia.]—**Изв. Отд. Прикладной Энтом.** [*Rept. Bur. App. Ent.*], ii, pp. 16–20. Petrograd, 1922. [Received 3rd May 1923.]

In South Russia, at least in Kharkov, *Aphis gossypii*, Glov., hibernates chiefly on shepherd's purse (*Capsella bursa-pastoris*); two individuals were found on *Datura stramonium*. Adults, larvae and nymphs were found on shepherd's purse, but not the sexual forms or eggs.

VASILEV (I. V.). **Новый вид листоблошки (р. *Trioza*, сем. Psyllidae) из Южной России.** [A new species of *Trioza* from South Russia.]—**Изв. Отд. Прикладной Энтом.** [*Rept. Bur. App. Ent.*], ii, pp. 21–24, 6 figs. Petrograd, 1922. [Received 3rd May 1923.]

Trioza brassicae, sp. n., is described from Kharkov. Though only found on cabbage, it does not apparently cause any serious damage to this crop. There are at least three generations a year, all stages overlapping throughout the summer and autumn. The eggs, about 30 in number, are usually laid on the lower surface of the outer leaves, and in June they hatch in about ten days. The larvae and nymphs remain stationary at the point of emergence. Hibernation occurs in the adult stage. This Psyllid is parasitised in the nymphal stage by Chalcids.

MEIER (N. F.). **К морфологии личинок некоторых наездников из семейства Ichneumonidae.** [On the Morphology of the Larvae of some Parasites of the Family Ichneumonidae.]—**Изв. Отд. Прикладной Энтом.** [*Rept. Bur. App. Ent.*], ii, pp. 25–39, 16 figs. Petrograd, 1922. With a Summary in English. [Received 3rd May 1923.]

The species dealt with include *Pimpla instigator*, F., and *P. rufata*, Gm., parasitic on *Aporia crataegi*; *Ichneumon bilunulatus*, Grav., a parasite of *Panolis flammea* (*piniperda*); and *Tryphon signator*, Grav., a parasite of *Cimbex variabilis*.

UVAROV (B. P.). **Об изучении саранчевых России.** [On the Study of Russian Locusts.]—**Изв. Отд. Прикладной Энтом.** [*Rept. Bur. App. Ent.*], ii, pp. 49–86. Petrograd, 1922. [Received 3rd May 1923.]

The paper gives a general review of some of the more important problems of the bionomics of locusts and indicates gaps in our present knowledge and lines for future research. The need for a thorough study of the systematics, distribution and ecology of Russian locusts is emphasised. The behaviour of the larvae of swarming locusts is discussed at length from the point of view of tropisms [*R.A.E.*, A, ix, 551]. The behaviour of adult swarms in general and their migrations in particular are also discussed more extensively than in the previous paper.

The author's theory of the periodicity of locusts [*loc. cit.*] is corroborated by the discovery of two distinct phases (swarming and solitary) in *Schistocerca gregaria*, Forsk., and *Cyrtacanthacris septemfasciata*, Serv., although the bionomics of these two species are very inadequately known. Suggestions as to the further study of periodicity are made, the importance of elucidating the interrelations of different species of locusts and their environment being especially urged.

A study of the parasites of locusts is also desirable; more detailed research on their bionomics and ecology and a quantitative analysis of their respective value in controlling locust outbreaks are necessary. An apparently undescribed Scelionid parasite of the eggs of *Locusta migratoria*, L., is recorded from Turkestan.

TROITZKI (N. N.). **К вопросу о периодичности массового размножения вредных насекомых. Опыт использования статистических материалов о повреждении озимей за 20 лет (1894–1914 г.г.). (Предварительное сообщение).** [On the Question of the Periodicity of Mass Development of injurious Insects. Experiments for utilising Statistics of the Injury to winter Crops for the 20 Years (1894–1914). (Preliminary statement.)—**Изв. Отд. Прикладной Энтом.** [*Rept. Bur. App. Ent.*], ii, pp. 87–97, 1 map, 1 chart. Petrograd, 1922. [Received 3rd May 1923.]

The importance of annual records of the occurrence and abundance of injurious insects is pointed out, particularly with a view to ascertaining whether certain pests occur again and again at definite periods. All available records from 1894 to 1914 for various parts of Russia are summarised.

From a comparison of these it is evident that the parasitic factor is not sufficient as an explanation of the cyclical abundance of *Agrotis*, this phenomenon being the result of many influences still requiring elucidation.

DOBRZHANSKI (F. G.). **Скопления и перелеты у божьих коровок (Coccinellidae).** [Gregariousness and Migration of Coccinellids.]—**Изв. Отд. Прикладной Энтом.** [*Rept. Bur. App. Ent.*], ii, pp. 103–124. Petrograd, 1922. [Received 3rd May 1923.]

The possible causes of migration in Coccinellids are discussed. They are considered to be purely of physiological origin and not a result of lack of food or similar conditions.

DOBRODEEV (A. I.). **The large Larch Sawfly** (*Nematus erichsoni*, **Hartig) and its damage.—Изв. Отд. Прикладной Энтом.** [*Rept. Bur. App. Ent.*], ii, pp. 169–173, 5 figs. Petrograd, 1922. [Received 3rd May 1923.]

This paper on *Lygaeonematus* (*Nematus*) *erichsoni*, Hart., now published in English, has already been noticed [*R.A.E.*, A, x, 434].

POKROVSKI (E. A.). **Вредители полевых сельско-хозяйственных культур в Петровско-Разумовском в 1921 году в связи с метеорологическими особенностями этого года.** [Agricultural Field Pests of the Moscow District in 1921 in connection with meteorological Conditions of that Year.]—**Изв. Отд. Прикладной Энтом.** [*Rept. Bur. App. Ent.*], ii, pp. 181–221. Petrograd, 1922. [Received 3rd May 1923.]

A list is given of the agricultural insect pests recorded in the Moscow District during 1921. Their seasonal occurrence and abundance is discussed with special reference to the influence of the meteorological conditions of that year.

BOGOIAVLENSKI (S. G.). (*Melitaea didyma*) **Шашечница О. в 1922 г. в Воронежской губ.** [*Melitaea didyma* in the Voronezh District in 1922.]—**Изв. Отд. Прикладной Энтом.** [*Rept. Bur. App. Ent.*], ii, pp. 223–228. Petrograd, 1922. [Received 3rd May 1923.]

During 1922 *Melitaea didyma* caused serious injury to sunflowers in the district of Moscow. The larvae of the first generation, which alone proved injurious, had all pupated towards the end of May.

Pupation lasted 20 days. Eggs were laid about the middle of June, and only on *Linaria* spp. in nature. Incubation lasts about six days. The first larvae of the second generation appeared on the 21st June and occurred only on *Linaria genistifolia*. The first adults of this generation were noticed on 4th August. This butterfly hibernates in the third larval stage. It is parasitised by a Hymenopteron and a Dipteron.

DOBRZHANSKI (F. G.). **Имагинальная диапауза у божьих коровок.** [Diapause of Adult Coccinellids.]—**Изв. Отд. Прикладной Энтом.** [*Rept. Bur. App. Ent.*], ii, pp. 229–234. Petrograd, 1922. [Received 3rd May 1923.]

In this preliminary statement the author describes the development of the reproductive organs of Coccinellids, from which it is evident that *Coccinella septempunctata*, L., and *C. quinquepunctata*, L., only have two generations a year under the climatic conditions of Kiev. Temperature and food-supply do not influence the number of generations produced, as has been thought by many previous observers. Apparently *Coccinella quatuordecimpustulata*, L., and possibly *Stethorus punctillum*, Wse., have only one generation a year.

In the case of *C. septempunctata* the females of the second generation practically cease feeding and enter a resting state (diapause), which lasts from the end of the summer to the spring of the following year, during which time they remain sexually immature. Fertilisation may occur before or after this diapause, as the males of both generations develop equally rapidly, but oviposition only takes place in the middle of the summer. The diapause enables the females to survive a long period practically without food, the reproductive period coinciding with the abundance of suitable food.

In exceptional cases individuals of *C. septempunctata* may hibernate in the pupal stage.

Retarded development of the reproductive organs was observed in all the species examined, of which there were over 30, but the time at which the adults become sexually mature in the spring varies according to the species.

BOGDANOV-KATKOV (N. N.). **Список русской литературы по Прикладной Энтомологии (и отчасти Прикладной Зоологии) за 1917–1921 г.г. II.** [List of Russian Literature on Applied Entomology (and partly Applied Zoology) for 1917–1921. II.]—**Изв. Отд. Прикладной Энтом.** [*Rept. Bur. App. Ent.*], ii, pp. 235–239. Petrograd, 1922. [Received 3rd May 1923.]

This is the second part of a list of Russian literature [*R.A.E.*, A, x, 222], which is, however, still incomplete.

TROITZKI (N. N.). **Организационный план и Задания экспериментальной станции по прикладной энтомологии.** [Problems and Plan of the Organisation of the Experiment Station of Applied Entomology.]—Suppmt. no. 1 to **Изв. Отд. Прикладной Энтом.** [*Rept. Bur. App. Ent.*], ii (1922), 15 pp. Petrograd, 1923.

Projects for the immediate future include studies on *Hylemyia* spp., *Oscinella* spp. and *Anthonomus pomorum*, L.

ZVEREZOMB-ZUBOVSKI (E. V.). **Определитель главнейших насекомых, встречающихся в зерне и зерновых продуктах.** [Key to the chief Insects found in Grain and its Products.]—**Труды Отдела Прикладной Энтомологии, С.Х. Ученый Комитет Н. К. З.** [*Works Dept. App. Ent., Agric. Sci. Com. Nation. Commissariat Agric.*], xii, no. 1, 52 pp., 79 figs. Petrograd, 1923.

A preliminary chapter deals with the general anatomy of grain pests, the usual remedial measures, and instructions for using the key. The key covers the species injurious to stored grain and its products in Russia, both the Russian and scientific name of each species being given.

PARKER (T.). **The Suppression of Insect Pests and Fungoid Diseases. 3. The Fumigation of Commercial Glasshouses in the Growing Season.**—*Bull. Bur. Bio-Technology*, ii, no. 9, pp. 21–26. Leeds, March 1923.

The advantages of fumigation as opposed to dusting or spraying for dealing with glasshouse pests are enumerated. The fumigation of glasshouses during the empty or dormant period has been discussed [*R.A.E.*, A, xi, 177]. In a mixed house in the growing season the process is attended with risk owing to the varying susceptibility of different plants to chemical absorption; this subject is one that requires further research. The essential conditions for successful fumigation are explained.

The best method of dealing with whitefly [*Trialeurodes vaporariorum*, Westw.] on tomatos is discussed [*R.A.E.*, A, x, 284]. Sodium cyanide has been used for some years for fumigation, but volatile chlorinated hydrocarbons are safer. Of these tetrachlorethane was considered too costly for trade growers, but a fumigant has now been compounded that can be used at the rate of 2–4 fluid oz. per 1,000 cu. ft., according to the temperature, air-tightness of the house and degree of infestation. This has been used with great success. Its chief advantage lies in its simplicity of application, while it does not check plant growth nor require drying of the plant roots prior to fumigation. It is slightly more costly than sodium cyanide. The house temperature for fumigation should be as near 70° F. as possible and not below 60° F. The fumigant is suitable for many other plants besides tomatos.

Against Aphids, nicotine is the most effective medium for use under glass and should be applied as a dust with a special vaporiser, as owing to the high boiling point of the liquid, its rate of evaporation in an ordinary hothouse is much too slow to be effective. It is sometimes made up with brown paper impregnated with the insecticide in such quantity that the paper when ignited gradually smoulders, causing volatilisation of the insecticide. The use of liquid sprays in tomato houses is deprecated because the moisture is likely to cause the appearance of *Cladosporium fulvum*, though this is less likely to happen if the insecticide used is also a fungicide.

PARKER (T.). **Nicotine Petroleum Emulsion : A Combined Insecticide.**—*Bull. Bur. Bio-Technology*, ii, no. 9, pp. 27–31. Leeds, March 1923.

The various classes of insecticides and the possibilities of combining these with each other and with spreaders are discussed. A very good combination has been found in a colloidal nicotine-petroleum emulsion, containing 2 per cent. nicotine and 50 per cent. petroleum oil of a particular specification; this can be used at 1 : 160 dilution

in the field for controlling Aphids, Psyllids and Capsids if used in conjunction with 0·2 per cent. calcium caseinate. Without the latter it is necessary to use nearly double the concentration. When the pure nicotine was replaced by an equivalent amount of nicotine sulphate the emulsion was very successful against woolly aphis [*Eriosoma lanigerum*], using high pressure and a coarse nozzle ; it is also effective against red spider under glass on cucumbers and tomatos, at a dilution of 1 : 200 applied in the evening, the plants being washed with clear water the following morning and a second application being given later.

Etude de M. le Docteur Faes sur les Traitements contre la Cochylis.—*C.R. Acad. Agric., France*, ix, no. 14, pp. 394–397. Paris, 1923.

Successful results obtained by the use of pyrethrum-soap solution against the vine moth [*Clysia ambiguella*] are discussed. Nicotine in a copper sulphate solution is also recommended, but the difficulty of deciding the exact moment for its application renders it unsuitable for use against the first generation larvae ; against the second generation, however, it is recommended in preference to the pyrethrum-soap solution.

de Seabra (A. F.). **Etudes sur les Maladies et les Parasites du Cacaoyer et d'autres Plantes cultivées a S. Thomé.**—*Mem. Soc. Portug. Sci. Nat.*, Ser. Zool. no. 2, 122 pp., 4 pl., 65 figs. Lisbon, 1922. [Received 7th May 1923.]

In this publication are collected a series of studies of the diseases and pests of cacao and other plants in San Thomé, which have been previously noticed [*R.A.E.*, A, vi, 52 ; vii, 268 ; viii, 491–493 ; ix, 57, 58 ; x, 298–300].

de Seabra (A. F.). **Insectes de S. Thomé provenant de la Mission d'étude du Professeur Sousa da Camara en 1920.**—Separate from *Anais do Instituto de Agronomia*, 21 pp. 19 figs. Coimbra, 1922. [Received 7th May 1923.]

The insects dealt with include a number of Coccids previously recorded [*R.A.E.*, A, vi, 384], as well as *Selenaspidus silvaticus*, Lind., on palm, bamboo, etc. ; *Aspidiotus camaranus*, sp. n., on coffee ; *Hemichionaspis aspidistrae*, Sign., on orange (*Citrus aurantium*), coconut (*Cocos nucifera*), *Acacia rubra*, etc. ; *Saissetia hemisphaerica*, Targ., on ornamental plants ; *Asterolecanium* sp. on cassava (*Manihot utilissima*) ; and *A. bambusae*, Bdv., on *Dendrocalamus giganteus*, *Gigantochloa aspera* and *Bambusa vulgaris*. A Capsid of the genus *Helopeltis* occurred on cacao. Coleopterous pests include *Oryctes latecavatus*, Fairm., the larvae of which feed on dead wood and leaves ; *Pachnoda prasina*, Karsch. ; *Apate monacha*, F., living chiefly on dead wood ; *Cosmopolites sordidus*, Germ., and *Temnoschoita quadrimaculata*, Gyll., on banana ; *Atractocerus brasiliensis*, Serv., on dead wood ; and *Mallodon downesi*, Hope, the larvae of which burrow in old or fallen trunks. *Chilomenes lunata*, F., is commonly found on plants attacked by Aphids, and should be encouraged in S. Thomé as a check on *Toxoptera aurantii* (*coffeae*) *thomensis* and other pests.

SEVERIN (H. C.). **Thirteenth Annual Report of the State Entomologist of South Dakota for the Period ending June 30, 1922.**—67 pp., 26 figs. Brookings, S.D. [n.d.]. [Received 8th May 1923.]

A list is given of the most harmful insect pests found in South Dakota in nursery inspections.

The most serious pests of apple trees are discussed, with full details of their bionomics and control. They comprise *Cydia* (*Carpocapsa*) *pomonella*, L. (codling moth), *Rhagoletis pomonella*, Walsh (apple maggot), *Hyphantria cunea*, Drury (fall webworm), *Mineola indiginella*, Zell. (leaf crumpler), *Tortrix* (*Archips*) *rosaceana*, Harr. (oblique-banded leaf-roller), *Malacosoma americana*, F. (tent caterpillar), *Parornix* (*Ornix*) *geminatella*, Pack. (unspotted tentiform leaf-miner), *Hemerocampa leucostigma*, S. & A. (white-marked tussock moth), *Aphis pomi*, DeG. (green apple aphis), *Lepidosaphes ulmi*, L. (oyster-shell scale), *Chionaspis furfura*, Fitch (scurfy scale), *Ceresa bubalus*, F. (buffalo tree-hopper), and *Chrysobothris femorata*, F. (flat-headed apple-tree borer).

WALLACE (F. N.) & OTHERS. **Report of the Division of Entomology.**—*4th Ann. Rept. Indiana Dept. Conservation, 1921–22*, pp. 26–40. Indianapolis, 1923. [Received 8th May 1923.]

Pests of some importance were *Aspidiotus perniciosus*, Comst. (San José scale), found in several nurseries; *Chionaspis pinifoliae*, Fitch (pine scale), which is becoming a serious pest—as hibernation occurs in the egg stage, treatment is more difficult in winter than in summer, and spraying should be done just after the eggs have hatched; *Diaspis carueli*, Targ. (juniper scale); and *Ancylis comptana*, Frolich (strawberry leaf-roller), a serious pest in northern Indiana.

Certain pests have caused much damage in particular districts, but as a whole they have not been so severe as in the past few years. *Ennomos subsignarius*, Hb. (snow-white linden moth) defoliated large areas of forests in the central part of the State. The larvae feed on the leaves of almost all forest trees, but about 75 per cent. were parasitised by Diptera, and it is probable these will control it in the next two or three years. The English sparrow has kept it from becoming a very serious pest, and is supposed to have eliminated it from the eastern States. There is one brood a year in Indiana, the adults emerging from the middle of June to the end of July. The eggs are usually deposited on the under sides of branches and along the trunks of trees in masses of 20 or more. They hatch in the following year at the end of April, and the larvae mature in about five weeks. Pupation lasts about two weeks. Artificial control is not practicable in forests, but isolated trees can be sprayed with 2 lb. powdered lead arsenate to 50 U.S. gals. water while the larvae are small. Orchards that are regularly sprayed probably need have no extra spraying to poison the larvae unless they appear in great numbers.

Aphids were very abundant, including *Eriosoma lanigerum*, Hausm., on apple and elm; *Aphis* (*Rhopalosiphum*) *prunifoliae*, Fitch, on apple as the buds were opening; *Macrosiphum rosae*, L., on roses; *M. rudbeckiae*, Fitch, on *Rudbeckia* and *Dahlia*; *Acyrthosiphon* (*Illinoia*) *pisi*, Kalt., on garden and sweet peas; *Aphis gossypii*, Glov., on cucumbers and melons; *Chaitophorus lyropictus*, Kess, and *Drepanaphis acerifoliae*, Thomas, on maple; *Aphis spireaella*, Schout., on *Spiraea*; *A. houghtonensis*, Troop, on gooseberries; *A. setariae*, Thomas, on

plum; *Chermes pinicorticis*, Fitch, on white pine [*Pinus strobus*]; and *Colopha ulmicola*, Fitch, on elm. For most species spraying with 1 fluid oz. nicotine sulphate (40 per cent.), 5 oz. fish-oil soap and 5 U.S. gals. water is recommended.

Termites caused more damage than in previous years. The two species that occur in Indiana differ from some of the tropical species in that they require moisture. All timber in buildings should be kept away from contact with the ground and so that it may be readily examined. Cinders are not a barrier to termites, and wooden floors should never be laid in direct contact with the ground on cinders.

Where ants infest the walls of houses, if the nest is located, carbon bisulphide should be injected into it. Where nests cannot be located, the ants should be poisoned with $\frac{1}{4}$ oz. tartar emetic, 2 oz. sugar and 1 pint water [*cf. R.A.E.*, A, x, 312]. In the case of species that are not attracted to sweet substances, beef broth, containing $\frac{1}{8}$ oz. benzoate of soda, may be substituted for the sugar syrup.

A brief account is given of the tarnished plant bug [*Lygus pratensis*, L.] [*R.A.E.*, A, x, 103]. The young may be killed by spraying with 1 fluid oz. nicotine sulphate (40 per cent.), 4 oz. fish-oil soap and 4 U.S. gals. water, but this is ineffective against the adults.

Heliothis obsoleta, F. (corn ear worm) was so numerous in the autumn of 1921 [*R.A.E.*, A, x, 312] that an increased outbreak was expected in 1922, but the reverse was the case, apparently proving Dr. Felt's contention that this moth does not survive the winter so far north, and that the adults fly from the south in the spring and summer.

DIETZ (H. F.). **The Chinch Bug in Indiana.**—*Indiana Dept. Conservation*, Pubn. no. 23, 8 pp., 6 figs. Indianapolis, March 1922. [Received 8th May 1923.]

The bionomics and control of the chinch bug [*Blissus leucopterus*] in Indiana have already been noticed [*R.A.E.*, A, ix, 337; x, 197].

HARNED (R. W.). **Annual Report of the Entomology Department.**—*35th Ann. Rept. Mississippi Agric. Expt. Sta., 1921–22*, pp. 19–23. Agric. and Mechanical Coll., Mississippi, 1922. [Received 8th May 1923.]

Systematic and biological studies on the scale-insects of Mississippi have been carried out, and it is known that over 80 species occur in the State. Some progress has been made in studies on pecan insects, and some important papers on bark-beetles have been published [*R.A.E.*, A, x, 361, 362; xi, 160]. During the spring of 1922 beetles of the genus *Lachnosterna* (*Phyllophaga*) caused more injury to pecan trees than in any previous year. In an orchard where trapping them at night by lanterns placed over tubs of oil and water has been practised for many years their numbers have been considerably reduced, and they appear to have caused less damage there than in previous years. So far 42 species of this genus have been recorded from Mississippi; of this number 22 were found in 1921 feeding on pecan trees, comprising:—*L. praetermissa*, Horn, *L. forbesi*, Glasgow, *L. congrua*, Lec., *L. prunina*, Lec., *L. calceata*, Lec., *L. bipartita*, Horn, *L. micans*, Knoch, *L. vehemens*, Horn, *L. ulkei*, Smith, *L. perlonga*, Davis, *L. fraterna*, Harr., var. *mississippiensis*, Davis, *L. forsteri*, Burm., *L. luctuosa*, Horn, *L. knochi*, Gyll., *L. implicita*, Horn, *L. hirticula*, Knoch, *L. profunda*, Blanch., *L. ilicis*, Knoch, *L. crenulata*, Froel., *L. parvidens*, Lec., *L. quercus*, Knoch, and *L. tristis*, F.

MORGAN (A. C.), McDUNNOUGH (F. L.) & CHAMBERLIN (F. S.). **The Tobacco Budworm and its Control in the Southern Tobacco Districts.**—*U.S. Dept. Agric.*, Farmers' Bull. 819, 11 pp., 3 figs., 2 tables. Washington, D.C., July 1917, revised February 1923.

This is a revision of a paper on *Heliothis* (*Chloridea*) *virescens*, F., which has already been noticed [*R.A.E.*, A, vi, 213]. Continued observations in the Florida shade-tobacco district show that in this region the budworm feeds sparingly upon plants other than tobacco, with the exception of beggarweed, on which it feeds in the autumn. Its natural enemies include the spider, *Peucetia viridans*, Hentz.; *Polistes bellicosus*, Cress., which destroys many of the larger larvae; *Sarcophaga sternodontis*, Towns., which deposits its eggs on the larvae; and a Hymenopteron of the genus *Toxoneura*, which also oviposits in the larvae, and is the most important parasite of the budworm. Calcium arsenate, even in very dilute quantities, causes severe scorching to tobacco, and should not be used as a substitute for lead arsenate against *H. virescens*.

HUTSON (J. C.). **Some Preliminary Notes on the Coconut Caterpillar in Ceylon.**—*Ceylon Dept. Agric.*, Bull. 58, 12 pp., 3 plates. Peradeniya, December 1922. [Received 8th May 1923.]

The previous history of *Nephantis serinopa* in Ceylon is reviewed. The greater part of the information contained in this paper has already been noticed [*R.A.E.*, A, x, 539]. According to Green, the eggs are laid amongst the frass and rubbish of the larval galleries, and the author has observed them in a similar manner on the cocoons. They may be laid actually on the leaf surface under the edge of the larval galleries or cocoons. In the absence of larval galleries some eggs were found on the under surface of the leaflets, either in a mass on the blade or in a row along the groove of the midrib. Moths confined with uninfested seedling palms deposited eggs in this position or actually on the basal part of a frond covered by the fibrous sheath, or occasionally on the leaf surface.

Under normal conditions the coconut caterpillar appears to be controlled periodically by parasites, but their efficiency may be much reduced by hyperparasitism.

AUSTIN (G. D.). **A Preliminary Report on Paddy Fly Investigations.**—*Ceylon Dept. Agric.*, Bull. 59, 22 pp., 10 tables. Peradeniya, December 1922. [Received 8th May 1923.]

The investigations on *Leptocorisa varicornis* here described were undertaken from December 1920 to June 1921. A list is given of wild grasses on which this bug was found to breed; *Panicum colonum* and *Cyperus polystachus* are the most favoured. The sap of the grain, when it is in the milky stage, is sucked by the adults, and they also feed on the tender leaves and shoots. They are most active during the cooler parts of the day and in cloudy weather, but are not strong fliers. Aestivation occurs in the adult stage during the hot months and especially during periods of drought. Mating usually occurs in the morning. There appears to be only a slight excess in the number of males over females. Under field conditions the adults live as long as 69 days, but experimentally they lived 105 or 115 days. Oviposition occurs at any time of the day, and the pre-oviposition period may be 14-71 days. The eggs are deposited singly in rows on the blades of rice and wild grasses and resemble grass seeds. Experimentally they

hatched in 4–9 days, and in the field about 81 per cent. of them are fertile. After the first moult the larvae travel upwards to a ripening ear, where they remain till the fourth moult. Experimentally and in the field the first instar occupied 2–3 days, the second, 2–4½ days, the third, 3–5 days, the fourth, 3–7 days, and the fifth, 4–9 days, the total period varying from a minimum of 16 to a maximum of 25 days, with an average of 19½ days.

Egg parasites (Proctotrupids) were rarely obtained. *Asopus malabaricus* was numerous in the field, and one individual, taken feeding on an adult, experimentally fed on two or three species of insects and even on a Curculionid. It lived 49 days and laid 285 eggs in 9 masses. The nymphs of this Pentatomid also readily attacked both adults and nymphs of *L. varicornis*. The Reduviids, *Harpactor fuscipes* and *Irantha* sp., were also predacious on all stages.

The use of large field nets is not practicable. Hand nets gave good results; winnows smeared with an adhesive were almost as effective. Ropes saturated with kerosene or smeared with an adhesive and dragged across affected fields did not give sufficiently good results to warrant their recommendation.

Experiments with a putrid meat bait [*R.A.E.*, A, vii, 493] gave no results, and crushed sugar-cane was not attractive.

SPEYER (E. R.). **Shot-hole Borer of Tea: Damage caused to the Tea Bush.**—*Ceylon Dept. Agric.*, Bull. 60, 16 pp., 12 figs., 2 graphs. Peradeniya, December 1922. [Received 8th May 1923.]

The exact extent of the damage caused by *Xyleborus fornicatus*, Eich., to the tea bush has never yet been fully defined. The work of excavation in the woody portions of the plant is done entirely by the female, and the damage may be the result of the removal of the plant tissues when the gallery of the beetle is being constructed and of any physical effects that may follow this, or of the growth of the ambrosia fungus that develops on the walls of the excavations and from which the larvae obtain their nutriment. The hollowing out of circular and spiral tunnels causes considerable breakage, especially in localities exposed to wind and in the dry seasons, and is most serious in young tea coming into bearing. The physiological damage to the tissues is described; this is not serious so far as the upper branches of a bush are concerned, but in the thicker branches and collar, which remain after pruning, the stained area decays entirely where the attack has been of long standing, and these portions are subsequently attacked by termites.

Though die-backs occur from various causes, they are vastly increased where the borer is prevalent, and it breeds in them for periods varying from one to four months, according to the elevation above sea level, when other branches with shoots will successfully resist attack. The healing of galleries is the only known natural control exercised upon the borer.

Some bushes, after running for a certain period from pruning, become liable to attack sooner than others, and these may be infested several times before neighbouring bushes, which do not show this liability till later. This immunity is doubtless influenced by cultivation and quality of soil. After pruning the appearance of new shoots on the bushes coincides with a healing of the galleries left below the level of pruning, and renders the bushes temporarily immune from attack until the new branches are matured and have formed new red wood

suitable for the beetle to breed in. Three-year intervals between pruning seem to give immunity for longer periods, but it is not recommended that any tea be run for a longer time than is consistent with obtaining a profitable yield from the estate. All methods of slashing and cutting across should be avoided as far as possible, and young tea should be allowed to run up for an extra period of time and then pruned down prior to the first tipping.

Other factors, such as rainfall, quality of soil, application of manure, and general estate conditions, make it difficult to estimate the loss of crop due to infestation. From observations on estates that have recently been attacked for the first time the loss of crop appears to have taken place just prior to a marked increase of the borer. The yellowing of the foliage is due entirely to prevailing climatic conditions; and the only general manifestation of the presence of the borer is shown by an increased number of die-backs in the field shortly after pruning, in the presence of broken branches in young and in flushing tea, usually shortly before pruning, and in the knotty, atrophied appearance of the frames of the bushes, resulting in the subsequent growth of "whippy" branches.

The investigations indicate that at every pruning, provided the wood of the pruning is burnt, a large number of adults and larvae is destroyed, and the natural immunity of bushes from attack when the new shoots appear exercises some temporary check on the borer. The most suitable time for remedial measures falls at those periods between the time of pruning and the appearance of the new shoots, and at such intervals between prunings as labour is available in estates. The cutting of die-backs and non-shooting branches at periods of one to four months after pruning, in accordance with elevation, does not provide for the prevention of the escape of borers immediately after pruning to other fields in full flush. A powerful insecticide at the time of pruning might have a deterrent effect and prevent young adults from excavating fresh galleries, at any rate temporarily, in the bush below the level of pruning; and if it kills the parent female or forces her to leave the gallery, the drainage system, which is regulated by her, breaks down, and any eggs or larvae, and probably even pupae, perish. In the case of a flushing bush, if the branches break when bent down, the indications are that borer is present, and they should be cut out and destroyed at a suitably early time after pruning; this can also be applied to young tea.

JARDINE (N. K.). **The Shot-hole Borer Pest.**—*Trop. Agric.*, lx, no. 2, pp. 72–75; also *Year-book Dept. Agric. Ceylon, 1923*, pp. 6–9. Peradeniya, February 1923.

This paper is a brief summary of published investigations into the control of the shot-hole borer, *Xyleborus fornicatus*, and shows that the bulk of the work has been concentrated on the question of disposal of prunings.

GADD (C. H.). **The Effect of certain Manurial Substances on Shot-hole Borer of Tea.**—*Trop. Agric.*, lx, no. 2, pp. 75–77; also *Year-book Dept. Agric. Ceylon, 1923*, pp. 9–11. Peradeniya, February 1923.

This paper gives the results of experiments that have been dealt with in greater detail in a bulletin previously noticed [*R.A.E.*, A, xi, 155].

Hutson (J. C.). **The Fringed Nettle-grub,** *Natada nararia*, **Moore.** —*Trop. Agric.*, lx, no. 2, pp. 77–81, 1 plate; also *Year-book Dept. Agric. Ceylon, 1923*, pp. 11–15, 1 plate. Peradeniya, February 1923.

Some twenty species of Limacodids have been recorded from Ceylon, those known to be more or less important tea pests being *Thosea cana*, Wlk., *T. recta*, Hmps., *T. cervina*, Moore, *Parasa lepida*, Cram., *Spatulicraspeda castaneiceps*, Hmps., *Belippa laleana*, Moore, and *Natada nararia*, Moore. The last-named has been known as a pest of tea for about 25 years. In areas where it has become established it probably breeds almost continually throughout the year, but is more prevalent from August to October and again in May and June.

The oviposition period lasts 2–10 days, the average number of eggs being about 200. In the field the eggs are laid singly on the upper surface of older leaves. They hatch in 5 or 6 days. The larvae became mature experimentally in 5–7 weeks, but the time is probably shorter in the field. The cocoon stage lasted 17–22 days, and in captivity the complete life-cycle occupied 8½–11 weeks, but it probably lasts about 7 or 8 weeks in the field under favourable climatic conditions.

This moth breeds freely on dadap (*Erythrina lithosperma*) and also feeds on toon (*Cedrela toona*), and sometimes on *Bignonia*, and the larvae have occasionally been found on *Eucalyptus robusta*, *Psidium polycarpon*, *Castanospermum australe*, *Tecoma stans*, *Thunbergia laurifolia* and *Rubus ellipticus*. The spread of this Limacodid seems to take place chiefly in the adult stage, especially when a strong wind is blowing. It is important that it should be checked at the outset, while it is confined to a few bushes.

In common with other nettle-grubs it is normally controlled by parasites, and in their absence it increases rapidly. The sudden disappearances that occur are partly due to parasites and heavy rains, but often mainly to the rapid spread of a highly infectious disease.

In small areas all caterpillars should be collected and destroyed, infested leaves picked and interplanted dadap lopped lightly. All fallen leaves and rubbish should be burned, and the leaves and twigs of the bushes searched for cocoons. Light traps on dark, still nights may catch a few adults. Affected areas may be sprayed with lead chromate resin compound, a non-arsenical spray that has no harmful effect on the trees or the tea. As an alternative to spraying the whole field should be pruned, working from the edges of the field towards the centre. All prunings and rubbish should be burnt immediately. This treatment should only be adopted in emergencies. The field should be manured after pruning.

Hutson (J. C.). **The Tea Leaf-skeletonizer. A Preliminary Note.**—*Trop. Agric.*, lx, no. 2, pp. 81–83, 1 plate; also *Year-book Dept. Agric. Ceylon, 1923*, pp. 15–17, 1 plate. Peradeniya, February 1923.

A brief account is given of a Pyralid [*Piesmopoda rufimarginella*, Hmps.] that has been recorded on tea in Ceylon. Its presence is usually detected by small masses of dead leaves near the top and in the middle of the bushes, and those severely infested may be partly defoliated. The leaves are loosely webbed together to form a kind of nest within which the larvae feed. A badly attacked leaf may have only the ribs and veins remaining. As a rule only the older leaves are attacked. An outbreak is frequently accompanied by a plague of spiders, and bushes may be

completely covered with a network of webbing. No moths have, however, been observed to be caught in the webs.

The adults probably hide in the bushes during the day, and are difficult to detect when at rest. In captivity oviposition begins about a week after emergence, and the females may live for another week or ten days. The eggs in the field have been found on dead leaves among grass and rubbish in a "nest." Experimentally they hatched in a week. The larval stage takes about 5–7 weeks in captivity, and probably the shorter period is the more normal one under field conditions. Cocoons are spun on dead leaves or on the green ones outside the "nest," and this stage lasts about 11–12 days.

This pest could probably be checked in the early stages of attack by having the masses of dead and dying leaves cleared out and burnt.

HUTSON (J. C.). **Notes on Termites attacking Tea in Ceylon.**—*Trop. Agric.*, lx, no. 2, pp. 83–87; also *Year-book Dept. Agric. Ceylon, 1923*, pp. 17–21. Peradeniya, February 1923.

There are several species of termites associated with tea in Ceylon, and their marked increase at various elevations has caused much alarm. They may be divided into those that form their colonies inside a living tea bush and bore into the heart-wood, and those that have their nest outside, usually underground, and generally attack the dead or dying bark and wood of various plants, including tea, rubber, dadap and *Grevillea*. The only species that bore into the heart-wood are *Calotermes militaris*, *C. dilatatus* and *C. greeni*. *C. militaris* is a fairly serious pest, being chiefly prevalent in the southern part of the Central Province, though it is sometimes found at lower elevations. *C. dilatatus* is mainly a mid to low-country species; it is thought to enter the bush at some old knot-hole or wound and gradually to work its way to the roots. A complete colony apparently exists in each infested bush, and there are indications that this species has winged adults. *C. greeni* has a wide distribution and has winged adults. *C. militaris* is the most formidable pest, as it may escape detection at pruning time. The other two probably work for the most part above ground level and tend to be periodically controlled by pruning.

All completely riddled bushes should be eradicated and burned immediately. When the injury has been found in time it may be sufficient to clear out a cavity and paint the inside with a liquid wood preservative, such as a creosote solution, and then fill in the cavity with mortar or cement. Where there are only small galleries, the solution can be applied thoroughly to the cut surface.

The two common species that feed on dead and dying bark are *Termes obscuriceps* and *T. redemanni*. *T. horni* is sometimes found in bushes, but apparently does not construct mounds. *Eutermes* sp. and *Leucotermes* sp. are also occasionally found. In the author's opinion the prevalence of branch canker has been one of the contributing causes of the marked increase of *T. obscuriceps* and *T. redemanni* within recent years, the termites clearing away the bark and wood killed by the fungus. Such injuries are often attributed to *Calotermes*. Nests should be eradicated by using an ant exterminator with sulphur and arsenic, by fumigating with carbon bisulphide or by digging out the nests and destroying the queens and colony. Food supplies should be reduced by controlling diseases, shot-hole borer [*Xyleborus fornicatus*], red borer [*Zeuzera coffeae*], *Calotermes* sp. and other insects that injure the bushes, and by removing all old stumps and logs.

HUTSON (J. C.). **Some Insect Pests of the Coconut Palm.**—*Trop. Agric.*, lx, no. 2, pp. 103–109, 3 plates; also *Year-book Dept Agric. Ceylon, 1923*, pp. 37–43, 3 plates. Peradeniya, February 1923.

There are several caterpillars found on coconut leaves that may be mistaken for *Nephantis serinopa*, but they are not pests of healthy palms, as they only feed on dead leaves. The most common are *Herculia nigrivitta*, the larvae of which eat holes in dead leaves and help to produce the almost complete stripping of leaflets sometimes noticed after an outbreak of *N. serinopa*, and *Erecthis pachygramma*, which only nibbles away at the leaf surface. Neither of these species make compact webbed galleries as *N. serinopa* does.

The measures recommended against *N. serinopa* have already been noticed [*R.A.E.*, A, x, 539]. Attempts have been made to introduce a small Eulophid parasite from the Western side of the island, but it does not appear to have become established. Spraying with 1 oz. Paris green to 10 gals. water, to which about 3 oz. lime had been added, showed some prospect of success, but in Ceylon it would only be practicable to spray young palms up to five or six years old, and palms of this age are rarely attacked to any serious extent.

Minor coconut pests include *Aularches miliaris* (spotted locust), which usually occurs in fields overrun with grass and weeds, and in gardens where a variety of crops, including coconuts, are grown on the same land. The immature stages cluster on the ground or low branches and can be beaten down and collected into sacks or crushed or submerged in water. *Psyche albipes* covers itself with a case formed of small pieces of leaf and eats the leaflets. *Parasa lepida* (blue-striped nettle-grub) sometimes feeds on the leaflets; and *Gangara thyrsis* occasionally attacks the leaves, but cannot be considered a pest.

Aspidiotus destructor (coconut scale) is not so serious a pest in Ceylon as in some other countries, as it seems to be controlled by parasites and fungous diseases.

AUSTIN (G. D.). **Paddy Fly** (*Leptocorisa varicornis*, **F.**).—*Trop. Agric.*, lx, no. 2, pp. 118–119; also *Year-book Dept. Agric. Ceylon, 1923*, pp. 52–53. Peradeniya, February 1923.

This paper is a summary of the investigations on *Leptocorisa varicornis*, F., that have already been noticed from another source [*R.A.E.*, A, xi, 311].

JARVIS (H.). **Fruit Fly Investigations.**—*Queensland Agric. J.*, xix, pt. 3, pp. 194–197. Brisbane, March 1923.

Traps for *Dacus ferrugineus* (*Chaetodacus tryoni*), placed in trees bearing fruit, have proved disappointing, and better results were obtained in those from which the fruit had already been gathered. In two weeks 200 flies, of which about 60 per cent. were females, were captured in this manner by the Japanese glass fly-trap suspended from a branch of the tree, and not placed on a flat board between two branches as is the usual practice. Repellents, such as creosote or coal-tar, have so far given negative results. Fruit-fly maggots have been found in grapes at Rivertree, New South Wales. *Diachasma tryoni*, which was introduced in March 1922 [*R.A.E.*, A, x, 478], has not been recovered, and it is proposed to secure further supplies

from Brisbane. If the Chalcid, *Syntomosphyrum indicum*, Silv., could be introduced and acclimatised, it should prove of great value as a parasite.

Other injurious insects are *Orthorhinus cylindrirostris* (elephant weevil), larvae of which were found in grape-vine cuttings. This weevil is a minor pest of *Citrus* and other economic plants in Queensland and has been recorded as boring through lead pipes. *Lonchaea splendida* is found in ripe tomatos and often mistaken for *Dacus ferrugineus*, but it never occurs in sound fruit, the eggs being laid in cracks that are already present. Larvae of *Notolophus* (*Orgyia*) *posticus* have caused damage by eating the leaves of apple and plum trees and cultivated shrubs. They should be easily controlled with the ordinary codling moth spray, about ½ oz. lead arsenate to 20 gals. water.

JARVIS (E.). **Cane Pest Combat and Control.**—*Queensland Agric. Jl.*, xix, pt. 3, pp. 206–207. Brisbane, March 1923.

The dry weather at the end of 1922 has proved a severe check on the increase of the grey-back beetle, *Lepidoderma albohirtum*, Waterh. Attention has been given to a few related species of Scarabaeids, the life-history of which has not been worked out. Although *Anoplostethus latus* or *Calloodes atkinsoni*, for example, are not at present of economic importance, they may appear in cultivated land and acquire a liking for roots of sugar-cane. Special metal hand-injectors invented by the author for the purpose of administering paradichlorobenzene in dry crystalline form are described. In attempts to ascertain the proportion of the sexes in *L. albohirtum*, of 223 beetles, 142 were females. This indicates that collection of beetles from trees adjoining headlands of canefields can be profitably carried out for a month following any big emergence. Of 200 beetles taken resting in trees during the day, 31 per cent. harboured Dipterous parasites.

TRYON (H.). **The Cotton Worm** *Chloridea* (*Heliothis*) *obsoleta*, **Say.** —*Queensland Agric. Jl.*, xix, pt. 3, pp. 220–232, 2 plates. Brisbane, March 1923.

The literature on *Heliothis* (*Chloridea*) *obsoleta*, Say, is reviewed, and a brief description is given of all its stages. In Queensland it usually attacks maize, tomatos, tobacco, peas and cotton, and in the case of the latter it is not the first generation larvae that are ordinarily associated with the damage. If good growing conditions prevail, the plants may completely recover even after defoliation. The most serious form of injury is to the flower buds. If the bolls are primarily attacked, the damage is less extensive than when the buds are injured.

As many as 500–3,000 eggs may be laid by one female. In Queensland there are no data as to the number of generations.

The measures recommended are planting maize as a trap crop and clean cultivation [*cf. R.A.E.*, A, vi, 81]; poisoning with arsenical salts and the use of trap lights have proved unsuccessful. A Braconid parasite of the larvae, closely allied to, or possibly identical with, *Microplites nigripennis*, Ashm., which is a parasite of this moth in the United States, has been found in Queensland; and apparently there are many predacious enemies, the larvae themselves being inveterate cannibals.

ANDERSON (L. A. P.). **A Note on a Method of Fumigation by Hydrocyanic Acid Gas on a small Scale.**—*Ind. Jl. Med. Res.*, x, no. 4, pp. 1119–1122. 2 figs. Calcutta, April 1923.

The method of fumigation described in a previous paper [*R.A.E.*, B, ix, 16] has been adapted by the author for the treatment of bags of grain heavily infested with weevils. The process was carried out in an ordinary wooden packing case of about 20 cu. ft. capacity, all joints between the wood being sealed with paper. A number of light shelves were made of narrow boards loosely nailed together and made to rest about 6–8 in. apart by means of small wooden blocks fixed inside the case. The grain to be fumigated is spread out to a depth of 1½–2 in. on empty sacks laid over the shelves. The gas is generated in a flask, and is passed through a system of rubber and glass tubes, entering through a rubber bung near the bottom of the box and being distributed between the lower layers of grain. About 160 lb. of grain can be treated at once in this way, using six shelves. In the flask were placed 30 grams of potassium cyanide and 90 cc. of diluted sulphuric acid, 1 part to 2½ parts water. Air was not withdrawn from the case during fumigation, but a gas outlet was made in the lid of the box and closed by a rubber bung, and this was left slightly open for a moment at the beginning of the operation. The treatment lasted 3½–4 hours, but no harm was done if the case was left unopened for 24 hours. Germination is unimpaired, and after three months treated grain remained uninfested, so that the eggs must also have been destroyed. The operation should be carried out for preference in the open air, and the lid of the case left open for half to three-quarters of an hour before removing the grain.

DELASSUS (—). **Les traitements arsenicaux des arbres fruitiers.**—*Rev. agric. Afr. Nord*, xxi, no. 196, pp. 278–282, 1 fig. Algiers, 4th May 1923.

Fruit-growing is very successful in many parts of Algeria, but very little is done to combat the pests of leaves and fruit, which often cause serious losses to the crop, especially *Cydia* (*Carpocapsa*) *pomonella*, L. As the spring is often very dry, arsenicals should be applied as soon as possible after blossoming, within a limit of ten days after blossoming usually occurring from the 10th to 20th of April. The regulations governing the use of arsenical salts are quoted, and the preparation of mixed arsenical and copper sulphate solutions is explained.

KLEINE (R.). **Die Standpflanzen von** *Chrysomela sanguinolenta*, **L.** [The Food-plants of *C. sanguinolenta*.]—*Ent. Blätter*, xix, no. 1, pp. 43–46. Berlin, 31st March 1923.

The contents of this paper are indicated by its title. *Chrysomela sanguinolenta* belongs to the large group of Chrysomelids that infest the Labiatae, and, like the majority of those feeding on these plants is found on the genus *Mentha* and its allies.

URBAN (—). *Sitona humeralis*, **Steph.**—*Ent. Blätter*, xix, no. 1, p. 48. Berlin, 31st March 1923.

Hibernated larvae of *Sitona humeralis* Steph., have been observed feeding on the roots of *Trifolium hybridum* [*cf. R.A.E.*, A, ii, 181]. They pupated in May, the adults appearing from the end of that month onwards.

THOMSEN (M.). *Euthrips parvus*, **Moulton, ein neuer Gewächshaus-schädling.** [*E. parvus*, a new Greenhouse Pest.]—*Ent. Medd.*, xiv, no. 2–3, pp. 110–119, 7 figs. Copenhagen, 1923.

In recent years the leaves of *Begonia* in Danish greenhouses have been attacked by *Euthrips parvus*, Moult., and as more tissue cells are destroyed than are actually eaten, a few individuals can cause considerable injury. Species of *Begonia* with fine, thin leaves appear to suffer most. *E. parvus* also infests *Anthurium*, *Philodendron*, *Caladium* and *Dieffenbachia*. On *Cyclamen* it is the underside of the leaf that is preferred. It occurs up to the end of September on plants exposed to temperatures of 5°–8° C. [41°–46·4° F.], or even lower. It has been recorded from California, Denmark, Sweden, and perhaps Norway. Nicotine fumigation is effective against it, and hydrocyanic acid gas should also give good results.

DEUSGAARD (N.). **Et Angreb af** *Biston zonaria* **paa Lucerne.** [An Attack of *B. zonaria* on Lucerne.]—*Ent. Medd.*, xiv, no. 2–3, pp. 130–131. Copenhagen, 1923.

The larvae of *Biston zonaria* were noticed in the summer of 1922, in Denmark, injuring lucerne. In 1918 they were found in a carrot field.

KOCH (A.). **Entomologische Technik.**—*Handb. biol. Arbeitsmethoden*, Abt. ix, Teil 1, Heft 3, pp. 479–534, 31 figs. Berlin, Urban & Schwarzenberg, 1923. (Part 94, Price 6·30 Swiss francs.)

This paper deals with the collection, breeding, mounting and storage of insects. The apparatus used and the methods followed are clearly described, and the instructions are of a practical character.

La langosta. Invasión 1921–22. [The Locust Invasion of 1921–22.]—*Uruguay: Minist. Indust., Defensa Agricola, Bol. Mens.*, iii, no. 1, pp. 5–8. Montevideo, January 1922. [Received 8th May 1923.]

After being free from locusts since 1917–18, Uruguay was invaded in 1921–22 by swarms coming eastwards from Argentina across the Uruguay River. A brief account is given of the manner in which the invasion took place.

Trabajos realizados para defenderse de la cochinilla denominada *Aspidiotus perniciosus*. [The Work done to guard against *A. perniciosus*.]—*Uruguay: Minist. Indust., Defensa Agricola, Bol. Mens.*, iii, nos. 1 & 2, pp. 9–13, 19–20, 1 sheet of illustrations. Montevideo, January & February 1922. [Received 8th May 1923.]

In view of the occurrence and increase of *Aspidiotus perniciosus*, Comst. (San José scale), in the Republic of Argentina, the Uruguayan authorities have specified Montevideo as the sole port of entry for imported plants, or parts of plants, and publish the rules to be followed as regards inspection and treatment.

TRUJILLO PELUFFO (A.). **Dos nuevos cóccidos para el Uruguay.** [Two Coccids new to Uruguay.]—*Uruguay : Minist. Indust., Defensa Agrícola, Bol. Mens.*, iii, no. 4, pp. 48–50, 6 figs. Montevideo, April 1922. [Received 8th May 1923.]

Chrysomphalus paulistus, Hemp., and *C. dictyospermi*, Morg., are recorded for the first time in Uruguay, the former from *Ligustrum japonicum* and the latter from cherry.

BAEZ (H.). **Las hormigas.** [Ants.]—*Uruguay : Minist. Indust., Defensa Agrícola, Bol. Mens.*, iii, no. 7, pp. 101–104, 3 figs. Montevideo, July 1922. [Received 8th May 1923.]

During the warm months ants are important pests in Uruguay, and their destruction is obligatory. The most common species are *Atta lundi* and *A. sexdens*. The usual methods of destroying them are outlined, including that of placing lumps of potassium cyanide in the nests.

TRUJILLO PELUFFO (A.). *Aspidiotus hederae* **(Vall.).** *Cochinilla* **del paraiso.** [*A. hederae*, the Scale of *Melia azedarach*.]—*Uruguay : Minist. Indust., Defensa Agrícola, Bol. Mens.*, iii, no. 7, p. 109, 1 fig. Montevideo, July 1922. [Received 8th May 1923.]

Aspidiotus hederae, Vall., one of the scales introduced into Uruguay, has hitherto been found there on *Melia azedarach* only, but it has now been noticed on *Ligustrum japonicum* and on ivy. A 15 per cent. solution of lime-sulphur, a 3 per cent. solution of petroleum emulsion, and a 10 per cent. solution of "Rubina" [a compound of vegetable tar and an alkali] are the winter sprays recommended against it.

TRUJILLO PELUFFO (A.). **El** *Aphelinus mali*. **Su envio al extranjero.** [*A. mali*. Its Despatch Abroad.]—*Uruguay : Minist. Indust., Defensa Agrícola, Bol. Mens.*, iii, no. 8, pp. 114–116, 1 fig. Montevideo, August 1922. [Received 8th May 1923.]

Since its introduction into Uruguay early in 1921 *Aphelinus mali*, Hald., has exercised very effective control on the woolly aphis [*Eriosoma lanigerum*]. In 1922 batches of this parasite were sent to Argentina, England, Italy and Chile.

SCHURMANN (J. B.). **El** *Margarodes vitium*.—*Uruguay : Minist. Indust., Defensa Agrícola, Bol. Mens.*, iii, no. 8, pp. 117–121. Montevideo, August 1922. [Received 8th May 1923.]

The scale, *Margarodes vitium*, Giard, is only found in Chile, Argentina and Uruguay. It occurs on wild plants such as *Baccharis*, and on the introduction of the grape-vine adapted itself to it. After mating, the female oviposits in the ground, at a slight depth and more or less close to vine roots. Oviposition lasts from eight days to three weeks, and from 700 to 900 eggs are laid. The larvae hatch in ten days to three weeks, and seek young and tender roots. When they reach the nymphal stage, they are very resistant to cold and drought. Desiccated nymphs may be kept for years until favourable conditions of temperature and humidity enable development to proceed. It has been stated that they can survive submersion for months, but it is certain that alternating

damp and drought is a condition highly unfavourable to them. After the last nymphal moult the adult female ascends to the aerial part of the plant, remaining there for a short time until fertilised. Parthenogenetic reproduction may, however, occur.

It is only in the larval stage that *M. vitium* is injurious. Though opinions vary as to the extent of the harm done, the author's observations justify the view that it is a serious pest. The foliage of infested vines turns yellow, withers and falls. By the time the larva has entered the nymphal stage the injury has ceased, and as in some instances new shoots appear, the grower imagines that his vine has recovered. If the first attack is not so severe as to prevent the putting forth of new shoots, energetic measures must be taken to forestall a second attack, which is usually more serious. The infested plants in a vineyard form a distinct patch, which gradually enlarges until all the vines are included. The foci of infestation in the ground must be destroyed with carbon bisulphide, applied not only to the actual patch, but also to a belt surrounding it. This is a costly method, but the only reliable one. Using a Vermorel injector, three holes to the square metre should be bored to a depth of 10–12 in., and 10 cc. of carbon bisulphide should be placed in each. Another measure is flooding, which is usually impracticable in Uruguay; but where conditions render it possible, a depth of 8–12 in. of water should be left standing for 25–30 days. This work is usually done in winter. The cultivation of *Baccharis* as a trap has been advised, but it is ineffective and may be dangerous.

MOTE (D. C.). **Annual Report of the State Entomologist.**—*14th Ann. Rept. Arizona Commiss. Agric. & Hortic., 1921–22*, pp. 25–54, 5 plates, 10 tables. Phoenix, Ariz., 1923.

The inspection work for 1921–22 is reviewed, and a list is given of the pests intercepted. In order to prevent the introduction of pests by means of vehicles, inspection stations were established on roadways entering the State from districts infested with boll-weevil [*Anthonomus grandis*] and pink bollworm [*Platyedra gossypiella*]. The results emphasise the importance of enforcing this phase of plant quarantine.

A report is given by J. H. O'Dell on the inspection of cotton fields. The non-cotton zone established in 1921 on account of *Anthonomus grandis thurberiae* (thurberia or Arizona wild cotton boll-weevil) was continued in 1922, and no cotton was planted in this region. Self-sown cotton was found in a few fields, but no weevils were obtained. In November the cottonseed quarantine was modified, and the importation of seed grown in California was permitted subject to vacuum fumigation.

As vacuum fumigation of citrus stocks against scale-insects proved successful, an importation of such stock from California was permitted, and Quarantine no. 13 amended to that effect It has not been possible to remove the restrictions on the importation of apples, potatoes or grain from States infested with the alfalfa weevil [*Hypera variabilis*]. The work on the extermination of *Parlatoria blanchardi* (date palm scale) has been continued A list is appended of current quarantines and other restrictive orders up to the end of December 1922.

GLICK (P. A.). **Insects Injurious to Arizona Crops during 1922.**—*14th Ann. Rept. Arizona Commiss. Agric. & Hortic., 1921–22*, pp. 55–77, 1 fig., 1 plate. Phoenix, Ariz., 1923.

Among the insect pests recorded in Arizona during 1922, the following occurred in addition to many well-known ones: *Harrisina brilliana*

(grape leaf skeletoniser); *Cicada cinctifera*, in citrus groves; *Leptoglossus phyllopus* (pomegranate bug), destructive in the adult and nymphal stages; *Chilo loftini*, infesting casual plants of sugar-cane; *Chaetocnema ectypa* (corn flea-beetle), found on early maize in March, for which the young plants should be sprayed with Bordeaux mixture or lead arsenate; and *Discodemus reticulatus* (?), recorded as eating the bark of guayule rubber [*Parthenium argentatum*], the first record of this beetle feeding on cultivated plants in Arizona. *Ulus crassus* (tomato beetle) attacked young tomatos in March at the soil line, feeding on the stems and the plants when they fall. The poison bait for cutworms, substituting bran middlings or shorts for bran, is recommended against it. *Trichobaris mucorea* (tomato stalk beetle) attacked young tomatos and made deep furrows from the soil an inch or two up the stems. This is a well-known tobacco pest, and the treatment of tobacco plants will undoubtedly apply also to tomatos; the plants should be dipped in 1 lb. lead arsenate to 100 U.S. gals. water, and a lead arsenate spray should be applied a week or ten days later. The Pentatomid, *Chlorochroa sayi*, was very abundant from August till the end of September and caused noticeable injury to beans. A Chrysomelid, *Deloyala clavata*, was found in vegetable gardens where chillies were grown, eating large holes in the leaves and remaining on the undersides of them during the day. Its natural food-plant in Arizona is the ground cherry [*Physalis*]. Spraying with 1 oz. powdered lead arsenate to 2 U.S. gals. water is recommended, if the adults or larvae are numerous. *Euschistus impictiventris* (brown cotton bug) was recorded on cotton bolls, and was common in the Salt River Valley, but did not cause any appreciable damage.

A brief description is given of all stages of *Proleucoptera albella*, Chamb. (cottonwood leaf miner). This pest was found on poplars in the late summer and autumn of 1922. The adults emerge throughout the winter, and are frequently found on the ground during January. The larvae usually mine the entire leaf. If the larvae drop to the ground, they crawl under leaves or rubbish and pupate there, and if bushes grow beneath the trees, the cocoons may be spun on the foliage. Hibernation occurs in this stage. A parasite of the genus *Horismenus* infested about 60 per cent. of the pupae. The larvae did no great harm to the trees as they were at their maximum abundance just before the leaves were ready to fall. Further investigation is necessary to determine when the parasites are on wing before specific dates can be recommended for burning the fallen leaves without destroying them.

Glick (P. A.). **The Survey of *Myelois venipars*, Dyar, in Arizona.**—*14th Ann. Rept. Arizona Commiss. Agric. & Hortic., 1921-22*, pp. 78–97, 5 plates. Phoenix, Ariz., 1923.

During 1921 *Myelois venipars*, Dyar, damaged navel oranges in the Salt River Valley. Oranges are the primary food, and the various types in which the larvae occur are given. They are usually only associated with rot and injured fruit, and experimentally newly hatched larvae failed to enter perfect oranges. Once established they never come out of the orange, so that there is no danger of their crawling from one orange to another. A description is given of all stages. The eggs are deposited on oranges, with a maximum abundance from September to the middle of October, though they have been found as late as 20th November. The incubation period appears to be about four days. The larvae occur throughout the

year, but are most abundant during the late summer, autumn and early winter. Towards February mature larvae were frequently found. The cocoon usually occurs near the rind of the orange. Fully grown larvae removed from oranges usually pupated within 2 or 3 days. Pupae occur in oranges on the tree that are split, wounded, affected with rot, etc. During the winter they were found in oranges on the ground. In captivity the adults live 3–10 days, and this period may be longer in the field. They emerged throughout the winter. It has not yet been determined how far they can fly or whether they migrate, but larvae may be spread long distances by removal of infested oranges. A small Hymenopteron parasitises the egg. All fallen fruit should be picked up and destroyed.

GEORGE (D. C.). **Notes on Plant Diseases in Arizona, 1922.**—*14th Ann. Rept. Arizona Commiss. Agric. & Hortic., 1921–22*, pp. 98–109. Phoenix, Ariz., 1923.

The Nematode, *Heterodera radicicola*, causes a greater percentage of loss to apricots, almonds and peaches in Arizona than any single disease common to these crops in the State. Fig trees are probably more subject to attack than any other plant, but are seldom killed, as they seem able to develop new root growth as fast as the infested roots are destroyed. During 1922 Nematodes also attacked melon, cowpea, plum, tomato and watermelon.

BRIGGS (G.). **The Sorghums in Guam.**—*Guam Agric. Expt. Sta.*, Bull. 3, 28 pp., 9 plates. Washington, D.C., 4th November 1922. [Received 9th May 1923.]

The most troublesome pests of growing *Sorghum* in Guam are *Marasmia trapezalis* (leaf-folder), which binds the outer edges of the leaves together and feeds within them, and *Pyrausta nubilalis* (European corn-borer), which tunnels inside the stems, causing the terminal internodes to fall over. After thrashing, the heads of infested plants should be burned, together with the stalks and roots. Egg clusters should be collected and burned and the ground thoroughly cultivated both before and after planting. *Leptocorisa varicornis* (rice bug) damages *Sorghum* only when preferred crops are not available. Clean cultivation should prevent infestation by it.

BENTLEY (G. M.). **Pruning and Spraying the Home Orchard and Vineyard.**—*Tennessee St. Bd. Ent.*, Bull. no. 42 (xi, no. 3), revised, 31 pp., 45 figs. Knoxville, Tenn., September 1922. [Received 15th May 1923.]

This bulletin is practically identical with one already noticed [*R.A.E.*, A, vii, 315], the chief difference being in the spray schedules for apple and peach diseases and pests.

BACK (E. A.) & RABAK (F.). **Red Cedar Chests as Protectors against Moth Damage.**—*U.S. Dept. Agric.*, Bull. 1051, 14 pp., 5 plates. Washington, D.C., 13th April 1923.

Many experiments have been made to test the efficacy of chests made of red cedar (*Juniperus virginiana*) as a protection against *Tineola*

bisselliella, Hummel (clothes moth), and it was found that most of the larvae hatching from eggs within the chests died within 2 or 3 days, and all within 2 weeks. Larvae that were 3 or 4 months old, or more than half-grown, were not affected. The egg and adult stages were not influenced by the odour of the wood. The chests should remain tightly closed except when clothing is being taken in or out, and this should be done as rapidly as possible in order to retain the odour. Cedar chests are so tightly constructed that adult moths cannot get into them except when they are open. It is pointed out that a chest of ordinary wood, if as tightly constructed, would be just as effective, provided the clothing were thoroughly cleaned, brushed and aired in the sun, and from 1 to 2 lb. good grade naphthaline enclosed with it.

DAVIS (J. J.). **Common White Grubs.**—*U.S. Dept. Agric.*, Farmers' Bull. 940, 30 pp., 21 figs. Washington, D.C., August 1922. [Received 9th May 1923.]

This is a revision of earlier bulletins [*R.A.E.*, A, ii, 121; vi, 568]. In a summary of remedial measures for all stages of white grubs (*Lachnosterna* spp.) lantern traps are recommended during heavy flights of the beetles, and their food-plants should be sprayed with lead arsenate. When small grubs are numerous in autumn, the land should be thoroughly ploughed before 1st October and sown with small grain or clover. Pigs and fowls should be let loose in the field. Land infested with many small grubs in spring should be similarly treated; maize, potatoes, field beans, etc., should be planted on ground that has been clean-cultivated during the preceding year. When large grubs are numerous in autumn or spring, the land should be ploughed about 1st October or 15th July respectively. For beetles or pupae in the ground in summer, the clods should be broken after 15th July and pigs turned into the field.

CHITTENDEN (F. H.). **The Red-necked Raspberry Cane-borer,** *Agrilus ruficollis*, **F.**—*U.S. Dept. Agric.*, Farmers' Bull. 1286, 5 pp., 5 figs. Washington, D.C., September 1922. [Received 9th May 1923.]

The adults of the Buprestid, *Agrilus ruficollis*, F., appear in numbers in the district of Columbia in May and continue until August, their appearance coinciding with the blossoming of raspberry. They eat irregular holes in the leaves and deposit eggs on the young growth, raspberry, blackberry and dewberry being infested. The young larvae feed on the sapwood, just under the bark, and work spirally around the cane, galls being formed where girdling takes place. Later, they bore into the pith, where they form pupal cells in which to hibernate. The chief damage is the formation of these galls, which are generally from 1 to 3 in. long, consisting of enlargement of the cane and splitting of the bark. Canes so infested die or become so weakened that no fruit develops. The stages of the insect are described. Its numbers are considerably reduced by the parasites, *Microbracon xanthostigmus*, Cress., and *Charitopus magnificus*, Ashm. Canes showing galls should be cut out in late autumn, winter or early spring, and promptly burned, and wild canes, in which the insect can breed, should be cut down.

CRAIGHEAD (F. C.). **Experiments with Spray Solutions for preventing Insect Injury to green Logs.**—*U.S. Dept. Agric.*, Bull. 1079, 11 pp. Washington, D.C., August 1922. [Received 9th May 1923.]

An attempt has been made to discover a spray that will prevent insect attack in crude forest products such as green logs and timbers used in rustic constructions, though it is recognised that wherever possible it is better to control infestation by prompt handling between felling and sawing, or by submerging the logs in water. A repellent spray would also be efficacious against certain shade-tree insects and wood-borers that attack living trees. Several solutions that would be effective are too expensive or too difficult to apply. The requisites of a successful spray are effectiveness against several types of insect and on various kinds of wood, prevention of injury for at least one to three months, resistance to weather conditions and economy in use.

The tests were made against four types of insects: those that oviposit in crevices of bark, the larvae boring in bark and wood, such as *Neoclytus erythrocephalus*, F., on ash and hickory, *Xylotrechus colonus*, F., on oak and hickory, *Asemum moestum*, Hald., on pine, *Cyllene pictus*, Drury, on hickory, and *Hylotrupes ligneus*, F., on juniper; those that insert the egg beneath the bark, the larvae feeding directly beneath the bark and later in the wood, such as *Monochamus* (*Monohammus*) *scutellatus*, Say, and *M. titillator*, F., on pine; those that bore through bark and wood as beetles, such as various ambrosia beetles on pine and oak; and those that bore through the bark as beetles and oviposit beneath it, the larvae feeding under the bark and loosening it, such as various species of *Ips* on pine, *Phloeosinus* on juniper, and *Hylesinus* on ash. Dipping proved, on the whole, more effective than spraying, as every crevice in the bark was reached, and more economical, as a small quantity only of the solution was used in the bottom of a galvanised trough, the logs being revolved until all sides came into contact with the liquid. It was observed that logs on the ground in shady woods were always more heavily attacked than those off the ground and in the sun, and that thick-barked pine logs are much more favourable for infestation than thin-barked ones.

A large number of substances were tested, and a report is given on each. Several of the more active poisons seem to be effective against certain types of insects, especially the first type mentioned. They are particularly effective when combined with oils that will penetrate the bark; for example, $\frac{1}{4}$ oz. of corrosive sublimate, dissolved in $2\frac{1}{2}$ oz. of alcohol and added to $1\frac{1}{2}$ gals. of kerosene, was used to spray and dip pine and ash. The pine was attacked after 40 days by a few insects of the fourth type only; there was no other attack, and the ash was not attacked at all. Repeated in June, this treatment gave the same results. Similar results were obtained by using 1 part arsenic acid (30 per cent. AS_2O_5 by weight) to 9 parts water, followed by lime water, slight infestation occurring after 60 days; this latter, however, is difficult to apply. The best results were obtained, on the whole, with creosote oil either alone or diluted with 1–8 parts of kerosene; perhaps even greater dilutions would be effective on absorbent barks such as ash or juniper. These mixtures act as repellents; no oviposition occurred when they were present, and they were resistant to wet weather. All poisons were more effective on the more absorbent types of bark.

These results were not conclusive against ambrosia beetles, as the logs tested were too dry to be suitable for them. A further test was therefore made with water-soaked logs, and for these 1 part crude pyridin preparation to 8 parts kerosene gave the best results, kerosene and creosote oil also proving effective as repellents. Tests were also made with logs soaked in 2 lb. sodium arsenate to 10 gals. of water, to determine whether the adult beetles feed on the bark as they bore through it; the poison, however, had no effect on them.

Kunhikannan (K.). **An interesting Principle in Economic Entomology and some useful applications.**—*Bull. Ent. Res.*, xiii, no. 4, p. 404. London, April 1923.

As a great proportion of the larvae of *Oryctes rhinoceros*, when about to pupate, work their way down several inches below the floor of the manure pit in which they thrive, it is suggested that it may be possible to prevent their reascent as adults by covering the floor of the pit with a sheet of expanded metal with meshes 12 by 24 mm., which will permit the passage of the soft-bodied larvae, but not of the adults. It is thought that this method may prove of practical application in the control of various pests breeding in stored manure, such as the house-fly [*Musca domestica*], but it has not yet been tested.

China (W. E.). **A new Species of *Lygus* infesting Potatoes in Java (Rhynchota, Capsidae).**—*Bull. Ent. Res.*, xiii, no. 4, p. 447. London, April 1923.

Lygus solani, sp. n., is described from Java, where it was infesting the leaves and young shoots of potato plants.

Waterston (J.). **On an Internal Parasite (Hym.-Chalcidoidea) of a Thrips from Trinidad.**—*Bull. Ent. Res.*, xiii, no. 4, pp. 453–455, 2 figs. London, April 1923.

The Chalcid, *Tetrastichus thripophonus*, sp. n., is described, having been reared from larvae of a thrips in the pre-pupal stage on *Clydemia* sp. in Trinidad. The species is placed provisionally in this genus.

Cleare (L. D.). **Notes on the small Moth-borers of Sugar-cane in British Guiana.**—*Bull. Ent. Res.*, xiii, no. 4, pp. 457–468, 1 plate. London, April 1923.

The information contained in this paper has been noticed from another source [*R.A.E.*, A, xi, 113].

Green (E. E.). **On a small Collection of Coccidae from Mesopotamia, with Description of a new Species.**—*Bull. Ent. Res.*, xiii, no. 4, pp. 469–470, 1 fig. London, April 1923.

This collection includes *Pseudococcus citri*, Risso, on grape-vine; *Phoenicococcus marlatti*, Ckll., and *Parlatoria blanchardi*, Targ., on date palm (*Phoenix dactylifera*); *P. calianthina*, Berl. & Leon., on olive, oleander, rose, mulberry and *Zizyphus*; and *Asterolecanium phoenicis*, sp. n., on the leaf-stalks, leaves and fruit of the date palm.

Aulló (M.). **Reseña fitopatológica forestal.** [A Survey of Forest Phytopathology in Spain.]—*Rev. Fitopatología*, i, no. 1, pp. 8–11. Madrid, 1923.

In 1922 a considerable increase of the pine processionary caterpillar, *Cnethocampa* (*Thaumetopoea*) *pityocampa*, Schiff., was noticed in coniferous stands. *Rhyacionia* (*Evetria*) *buoliana*, Schiff., and *R. duplana*, Hb., were abundant in some places, as was *Dioryctria splendidella*, Ratz., in the shoots of *Pinus pinaster*. Less injury than in preceding years was done by *Dioryctria mendacella*, Stgr., *D. pinae*, Stgr., *Pissodes validirostris*, Gyll., *P. notatus*, F., *Liparis* (*Lymantria*) *monacha*, L., *Dendrolimus pini*, L., *Lophyrus sertifer*, Geoff., *Lyda hieroglyphica*, Christ., and *Brachyderes suturalis*, Graëlls. *Myelophilus piniperda*, L., *M. minor*, Hart., and *Phaenops cyanea*, F., were exceptionally harmful.

In the province of Segovia, pine shoots were attacked by *Magdalis memnonia*, Fald., associated with other weevils of this genus, and *Pissodes notatus*, F., the latter rapidly killing plants infested by it. The former, together with a fungus, *Lophodermium pinastri*, did serious injury to the crowns of the trees. The cones of *Pinus pinea* and *P. pinaster* are attacked by *Dioryctria mendacella* and *P. validirostris* in association.

Pests of deciduous trees included the Lepidoptera, *Porthetria* (*Lymantria*) *dispar*, L., *Malacosoma neustria*, L., and *Tortrix viridana*, L., on oaks, while *Nygmia phaeorrhoea*, Don. (*Euproctis chrysorrhoea*, L.) attacked *Quercus muricata*. Elms were infested by *Galerucella* (*Galeruca*) *luteola*, Müll.

Mercet (R. G.). **Los Calcídidos parásitos de orugas.** [Chalcids parasitising Lepidopterous Larvae.]—*Rev. Fitopatología*, i, no. 1, pp. 12–19, 1 fig. Madrid, 1923.

This is the first of a series of notes on Chalcids obtained from Lepidopterous larvae in Spain, and deals with the Spanish species of the genus *Chalcis*, to which a key is given. They include *C. intermedia*, Nees, from *Malacosoma neustria*, *Tortrix viridana* and *Porthetria dispar*; and *C. secundaria*, Ruschka, from *Notolophus aurolimbatus*, Gn. (*Orgyia guadarramensis*, Stgr.), but possibly as a hyperparasite.

Bolívar y Pieltain (C.). **Estudios sobre Calcididos de la familia Eupélmidos. I. Sobre el género** *Polymoria*, **Först.** [Studies on the Chalcids of the Family Eupelmidae. I. On the Genus *Polymoria*, Först.]—*Rev. Fitopatología*, i, no. 1, pp. 20–24, 2 figs. Madrid, 1923.

This is the first of a series of papers on Eupelmidae obtained by the Spanish Forest Protection Service. Of the three known species of *Polymoria*, *P. coronata*, Thoms., occurs in Spain. It was taken from branches of *Pinus pinaster* attacked by *Anthaxia fulgentipennis*, Ab., *A. nigritula*, Ratz., *Magdalis memnonia*, Gyll., and *M. violacea*, L., and from branches of *P. sylvestris* infested by *Anthaxia corsica*, Reiche, *M. memnonia* and *M. violacea*. The author has found a new species, which he describes as *P. iberica*, from branches of *Quercus ilex* attacked by *Coraebus fasciatus*, Vill., and another beetle.

MARINA (G.). **Estudio y extinción de la** *Thaumetopoea pityocampa*, **Schiff.** [The Study and Eradication of *Cnethocampa pityocampa*.]—*Rev. Fitopatologia*, i, no. 1, pp. 25–27. Madrid, 1923.

The pine processionary caterpillar, *Cnethocampa* (*Thaumetopoea*) *pityocampa*, Schiff., is a serious forest pest in Spain. In one case 26,810 webs, distributed among 146,652 pines on about 52 acres, were sprayed with petroleum, about 8 cc. of which sufficed to kill all the larvae in a web. From 124 to 181 larvae were counted in nests examined. Egg batches contained from 144 to 208 eggs, some of which were parasitised. In a stand of pines that were accessible without climbing 9,255 webs were removed from 40,000 trees. It has been stated that eggs are not laid at a height greater than 6½ ft. from the ground, but eggs were found between 3 and 15 ft., with large numbers higher up than 6½.

CONTINI (E.). **Delle principali malattie dell' olivo e sistemi per combatterle.** [The chief Diseases and Pests of the Olive and Methods for combating them.]—*Riv. Agric.*, xxviii, no. 18, pp. 277–279. Rome, 4th May 1923.

The chief pest of the olive in Italy is the olive-fly [*Dacus oleae*]; the usual poison-baits are recommended against it. Other important enemies are the olive scale, *Saissetia* (*Lecanium*) *oleae*, and a Psyllid [*Euphyllura olivina*], both of which may be combated with an emulsion of crude oil 1 part in water 20–30 parts; the olive moth [*Prays oleellus*] and the olive beetle [*Phloeotribus scarabaeoides*], for both of which a 1 per cent. solution of lead arsenate is advised; and [*Phloeothrips oleae*], which usually occurs in conjunction with the olive beetle and is checked by the spray applied against the latter; if it occurs alone, a nicotine spray should be used.

Larch-shoot Moths.—*Forestry Commiss.*, Leaflet No. 11, 4 pp., 5 figs. London, October 1922. [Printed April 1923.]

This paper on *Blastotere* (*Argyresthia*) *atmoriella*, Bankes, *A. laevigatella*, Zell., and *A. zelleriella*, Hart., is practically identical with one already noticed [*R.A.E.*, A, iii, 459].

MILLER (D.). **The Tomato-caterpillar Moth.**—*N.Z. Jl. Agric.*, xxvi, no. 3, pp. 170–171, 3 figs. Wellington, 20th March 1923.

A brief account is given of the life-history of *Heliothis obsoleta*, which is not an outstanding field-crop pest in New Zealand, although it is usually associated with *Cirphis unipuncta* and *Melanchra composita*. It feeds on maize, millet, etc., but in gardens it attacks tomatoes, beans, apples, peaches, etc. Spraying with lead arsenate when the caterpillars are small is effective, especially on tomatos. Thorough cultivation in winter is beneficial in view of the subterranean habits of the pupae.

VAYSSIÈRE (P.). **Le Pyrèthre. Sa culture ; ses propriétés insecticides.**—*Agron. colon.*, viii, no. 64, pp. 97–104, 1 plate. Paris, April 1923.

The advantages of the cultivation of *Pyrethrum cinerariaefolium* in small areas in the French colonies for the purpose of obtaining the insecticide in pure form and at little cost are pointed out. The method

of cultivation is described [*R.A.E.*, A, x, 231 ; xi, 231], and it is stated that in western Europe a plot of about 600 sq. yds. should yield about 66-77 lb. of dried flowers after the second year. The method of preparation of the insecticide and its action on various insects is discussed. It is particularly recommended in the form of pyrethrum-soap solution against the vine moths [*Clysia ambiguella* and *Polychrosis botrana*], the vine Pyralid [*Sparganothis pilleriana*], *Haltica* spp., *Byctiscus betulae* (*betuleti*), various Cetoniids, *Crioceris merdigera*, *Eurydema ornatum* (red cabbage bug), *Athalia colibri* (*spinarum*), *Eriocampoides limacina*, processionary caterpillars and *Pieris brassicae*, as well as various Aphids, *Stephanitis* (*Tingis*) *pyri* on pears, and thrips. The solution can also be added to copper sulphate mixtures without in any way altering their properties.

PILLAI (N. K.). **Insect Pests.**—*Rept. Dept. Agric. & Fisheries, Travancore, 1921–22*, pp. 19–20. Trivandrum, 1923.

Spodoptera mauritia (rice swarming caterpillar) is a serious pest, all stages occurring from November to February. Life-history studies gave records of 3–4 days for the egg stage, 14–17 days for the larva and 6–9 days for the pupa. Remedies that were found successful were oiling the water in the rice-fields with kerosene and dragging a heavy pole over the crop when the larvae are young, spraying with lead chromate and Paris green, and sprinkling finely powdered Paris green and lime on the crop. The rice stem-borer [*Schoenobius incertellus*] appeared as usual, and it was observed that after the first crop is harvested, the pest goes to the nurseries and from there to the second crop, so that there is continuous breeding from May to February. The rice bug [*Leptocorisa varicornis*] was controlled by bagging with hand nets. After the rice crop was harvested, this pest was found on screw pine. Another bug, *Bagrada* sp. was found attacking rice, but was controlled by bagging.

Coconut pests included the rhinoceros beetle [*Oryctes rhinoceros*], the larva of which was parasitised by a Dipteron, and *Nephantis serinopa*, of which extensive outbreaks occurred throughout the coastal region. The only effective remedy was to cut off and burn the affected leaves, though in the case of very young plants spraying with Paris green was of some value. Ginger was damaged by *Colobata* sp., the larvae feeding on the rhizome and destroying the crop. No remedial measures are known.

Departmental Activities: Entomology.—*Jl. Dept. Agric. Union South Africa*, vi, no. 4, pp. 288–290. Pretoria, April 1923.

Lecaniodiaspis mimosae, Mask. (thorn-tree scale) has again been recorded. It is an indigenous species, and *Acacia karroo* is its chief food-plant, but it also attacks other species of *Acacia*. Many years ago large patches of thorn were destroyed by it ; it not only injures the sap of the tree, but has a poisonous effect on it, and many farmers are anxious that the scale should reappear in strength in places where thorn usurps the veldt.

During February a high percentage of the woolly aphis [*Eriosoma lanigerum*] was attacked by the recently introduced parasite, *Aphelinus mali*. *Oncopeltus famelicus* did considerable damage to fig trees in the Transvaal, but the attack was an abnormal one, as the bugs had migrated from milkweed. Some damage has been reported to maize,

beans and lucerne by larvae of a species of *Phyllalia* and similar caterpillars. A further spread of *Lema bilineata*, which has caused considerable local damage to tobacco, is recorded, and it has been observed on a wild species of tobacco, probably *Nicotiana glauca*. A blister beetle, *Epicauta strangulata*, was recorded in thousands in Bechuanaland in January feeding on veldt grasses.

CHAPOULIE (P.). **Destruction des Parasites des Arbres fruitiers.**—*Rev. agric. Afr. Nord*, xxi, no. 197, pp. 296–301, 2 figs. Algiers, 11th May 1923.

The success of the polysulphide known as supersolfo in 2 per cent. strength against *Chrysomphalus dictyospermi pinnulifera* (*minor*) on oranges in Algeria is recorded. Stronger solutions than this are apt to cause scorching, and a $1\frac{1}{2}$ per cent. solution is recommended at the time of blossoming and on the young shoots, care being taken not to apply the poison during a sirocco, or in great heat. Treatment should be given early, in May or June, and for badly infested orangeries three applications are recommended, about 1st and 15th May and 15th June. An attempt to establish the predacious Coccinellid, *Cryptolaemus* sp., against the Coccid was successful on a small area, although only three larvae survived the importation. It has been stated that the mite, *Oribatula plantivaga*, has proved a useful enemy of *C. dictyospermi pinnulifera* in parts of Algeria; but it is doubtful whether it feeds on the living scales or only on their débris.

MOHR (E.). **Biologisches über** *Lepisma saccharina*, **L.** [Biological Notes on *L. saccharina*, L.]—*Zool. Anz.*, lvi, no. 7–8, pp. 174–181, 1 fig. Leipsic, 8th May 1923.

The foods preferred by *Lepisma saccharina* are flour and sugar, but it is also exceedingly destructive to books, papers and pictures. It will not feed on meat or other animal material, nor on cheese, white of egg, or rice, raw or cooked. It will readily eat bread, fruit and potatoes when kept moist. The eggs are laid in May, chiefly in flour, and were not found among paper or cloth. The larvae appear from the beginning of July. Hibernation lasts from about the beginning of November to the end of March.

DA COSTA LIMA (A.). **Insectos inimigos do abacateiro**—*Persea gratissima*, **no Brasil.** [Insect Pests of the Avocado Pear in Brazil.]—*Chacaras e Quintaes*, xxvii, no. 4, pp. 304–308. S. Paulo, April 1923.

In Brazil the avocado, *Persea gratissima*, has few, if any, serious pests. The following have been observed on the foliage, but in relatively small numbers: a thrips, *Heliothrips rubrocinctus*, Giard; an Aleurodid, *Aleurotrachelus* sp.; and the Coccids, *Platinglisia noacki*, Ckll., *Saissetia hemisphaerica*, Targ., *Aspidiotus destructor*, Sign., *Pseudaonidia trilobitiformis*, Green, *Chrysomphalus personatus*, Comst., *C. scutiformis*, Ckll., and *Ischnaspis longirostris*, Sign. Lamiid beetles, *Oncideres* spp., cut off the shoots and oviposit in the pieces removed, and shoots bored by *Acanthoderes jaspidea*, Germ., have been found. The Pyralid, *Stericta albifasciata*, Druce, may become important if its numbers increase, as its larva is a very voracious leaf-feeder. In November–December the larval stage required 27 and the pupal stage 17 days. It has been recorded as an avocado pest in the West Indies

R.A.E., A, viii, 131]. As the larvae are gregarious, the infested shoots should be cut off and burnt. The author failed in two consecutive years to find any parasitised eggs. The larva of *Stenoma catenifer*, Wlsm., is found either in the pulp of the fruits or within the seeds, and expels its excreta through the hole made when entering the fruit. While more than one larva may infest a given fruit, the presence of one is sufficient to destroy it. A larva found on 16th January pupated on 19th January and yielded an adult on 12th March. A Hymenopterous parasite, probably *Apanteles* sp., is evidently a very important factor in keeping *S. catenifer* in check. Infested fruits must therefore be stored so that the parasite may be able to escape.

VAN DER VLIST (P.). **Een paar minder bekende schadelijke insecten.** [A Couple of less known injurious Insects.]—*Maandbl. nederland, pomolog. Vereen.*, 1921, pp. 46–47. (Abstract in *Zeitschr. Pflanzenkr. u. Gallenkunde*, xxxiii, no. 1–2, p. 79. Stuttgart, 1923.)

The sawfly, *Hoplocampa testudinea*, is increasing in Holland, where it causes the dropping of young apples and pears. Spraying with a 0·1 per cent. solution of Paris green is recommended. An arsenical spray may also be used against the pear gall midge, *Contarinia pyrivora*, but spraying, just before blossoming, with substances having a repellent odour, seems preferable.

GIESENHAGEN (K.). **Entwicklungsgeschichte einer Milbengalle an** *Nephrolepis biserrata* **Schott.** [The Development of a Mite Gall on *N. biserrata*.]—*Jahrb. wiss. Botanik*, lviii, 1919, pp. 66–104.

DOCTERS VAN LEEUWEN-REIJNVAN (W. & J.). **Ueber die von** *Eriophyes paurópus* **Nal. an verschiedenen Arten von** *Nephrolepis* **gebildeten Blattgallen.** [On the Leaf-galls formed by *E. paurópus* on various Species of *Nephrolepis*.]—*Ann. Jardin Bot. Buitenzorg*, xxxi, pp. 83–91. (Abstracts in *Zeitschr. Pflanzenkr. u. Gallenkunde*, xxxiii, no. 1–2, pp. 86–88. Stuttgart, 1923.)

Leaf-galls on *Nephrolepis* spp., due to a mite, *Eriophyes pauropus*, Nal., are dealt with in both these papers.

ZVEREZOMB-ZUBOVSKI (E. V.). **Заметка о** *Caenocorse depressa*, **Fabr.—новом вредителе зерна.** [*C. depressa*, F., a new Pest of Grain.]—**Н.К.З. Краевое Управление по с.х. опытному делу Юго-Востока России (Дон и Северный Кавказ), Ростово-Нахичеванская н-Д. Областная с.х. опытная станция** [*Nation. Commissariat Agric. Div. Management Expt. Agric. South-Eastern Russia (Don and Northern Caucasus), Rostov-Nakhitchevan-on-Don Agric. Expt. Sta.*], Bull. 147, 6 pp., 9 figs. Rostov, 1923.

Though *Palorus (Caenocorse) depressus*, F., had not been noticed as a pest in Russia prior to 1916, it probably existed there, but may have been confused with *Tribolium confusum*, Duv. In the Don district there are two generations a year. Hibernation occurs in the adult stage, though in a few cases hibernating larvae were noticed (in warm places). Eggs are laid in April, and under laboratory conditions they hatch in from 10 to 12 days. About two months are required for the whole life-cycle of the beetle, the first adults of the spring generation being noticed in the first week of July. Owing to the long life of the adults, all stages may be found at the same time.

Section of Apiculture.—*Jl. Econ. Ent.*, xvi, no. 2, pp. 113–138. Geneva, N.Y., April 1923.

This series of papers on apiculture includes: Relation of the Texas Agricultural Experiment Station to Beekeeping in Texas, by M. C. Tanquary; A Two-year Brood Curve for a single Colony of Bees, by W. J. Nolan; Value of Winter Protection for Bees, by J. H. Merrill; and Rehabilitation Classes in Apiculture, by E. N. Cory.

Fracker (S. B.), Gooderham (C. B.) & Rea (G. H.).—**Protecting American Bees against the Introduction of the Isle of Wight Disease.**—*Jl. Econ. Ent.*, xvi, no. 2, pp. 133–136. Geneva, N.Y., April 1923.

The nature of the Isle of Wight disease of bees is discussed, and the text is given of Document 293 of the 67th Congress, which forbids the importation into the United States of the honey-bee (*Apis mellifica*) in its adult stage, unless imported for experimental purposes or from countries in which the Secretary of Agriculture shall determine that no diseases dangerous to adult bees exist, under regulations prescribed by the Secretary of the Treasury and the Secretary of Agriculture.

Marlatt (C. L.). **Work of the Federal Horticultural Board.**—*Jl. Econ. Ent.*, xvi, no. 2, pp. 138–141. Geneva, N.Y., April 1923.

An abstract is given of the author's account of the work of the Federal Horticultural Board. In the discussion following the paper, Mr. T. J. Headlee drew attention to the amount of damage done by the Japanese beetle [*Popillia japonica*] in 1922, and the necessity for thorough spraying with 4 lb. lead arsenate powder to 50 U.S. gals. of water, which reduces the numbers by 60 to 70 per cent. Natural enemies are apparently beginning to make some reduction in the numbers. Ploughing or disking the soil to a minimum depth of 4 in. when frost first appears in the ground seems to destroy practically all the grubs. A search is being made in Korea, northern China and northern India for additional parasites of the beetle, and quarantines for the purpose of limiting its spread are being vigorously enforced.

Haseman (L.). **Inspecting Nursery Stock at Digging Time.**—*Jl. Econ. Ent.*, xvi, no. 2, pp. 141–146. Geneva, N.Y., April 1923.

It is hoped that in time the present system of inspection work may be revolutionised, and that all nursery stock will be inspected at the time of digging up the plants, so that a uniform system of certification, probably regional, may be adopted. There are great opportunities in inspection work, but the scheme suggested would require large funds.

Sasscer (E. R.). **Important Foreign Insects collected on Imported Nursery Stock in 1922.**—*Jl. Econ. Ent.*, xvi, no. 2, pp. 152–158. Geneva, N.Y., April 1923.

A preliminary list is given of the more important insects, including many Coccids, intercepted on foreign nursery stock arriving in the United States in 1922. A more complete list will be issued later.

HEADLEE (T. J.). **The Present Status of the Gipsy Moth in New Jersey.** —*Jl. Econ. Ent.*, xvi, no. 2, pp. 158–161. Geneva, N.Y., April 1923.

A table is given recording the areas of infestation of the gipsy moth [*Porthetria dispar*] in New Jersey. The extent of infestation is being rapidly reduced in consequence of the co-operative work of the Federal Government and New Jersey State and of the large appropriations devoted to the purpose. The extermination of the moth within the State is considered possible, and the resolutions passed at the Albany Conference [*R.A.E.*, A, xi, 301] are recorded.

ARNOLD (G. F.). **Uniformity of Nursery Stock Fumigation Requirements.**—*Jl. Econ. Ent.*, xvi, no. 2, pp. 161–168. Geneva, N.Y., April 1923.

Uniform regulations for fumigating nursery stock are very desirable. The difficulty in the way of adopting a standard fumigation schedule is the variation in humidity and temperature in the different States at the time of fumigation. States in a group where these conditions are very nearly uniform, such as all southern States, could, however, adopt uniform regulations. It is suggested that a number of experiments should be conducted in several parts of the United States to determine what fumigation requirements may be considered as standard in each group of States. It is advisable that the grade of cyanide to be used should be specified, and another factor requiring attention is the temperature at the time the work is done.

After some discussion, it was resolved that a uniform certificate should be required for inter-State movement of nursery stock, and that the qualifying inspection should be worked out between the U.S. Department of Agriculture and the State authorities. A committee was appointed to organise the working out of this scheme on practical lines.

OSBORN (H.). **Standards for the Training of Men who are to enter Professional Entomology. Personal Contact with Students.**—*Jl. Econ. Ent.*, xvi, no. 2, pp. 168–172. Geneva, N.Y., April 1923.

The necessity for a standard for the training of men as professional entomologists is urged, and students are advised to get in touch with station and extension workers and to take summer courses with the Bureau of Entomology or the station entomologists.

MOORE (W.). **The Need of Chemistry for the Student of Entomology.**—*Jl. Econ. Ent.*, xvi, no. 2, pp. 172–176. Geneva, N.Y., April 1923.

The advisability of the economic entomologist being well grounded in chemistry is obvious, a knowledge of organic and physical chemistry being indispensable for enabling him to solve the problems connected with the use of insecticides. Co-operation between the entomological and chemical departments of the universities should make it possible for the entomological student to obtain such knowledge without spending a great deal of time on the branches of chemistry that are unnecessary to him. It is almost certain that there are still many new and important insecticides to be discovered among the organic chemicals, and a knowledge of colloidal chemistry is also of value for insecticide work.

O'Kane (W. C.). **The Entomologist and the Public.**—*Jl. Econ. Ent.*, xvi, no. 2, pp. 176–182. Geneva, N.Y., April 1923.

The qualifications of a successful entomologist in his contact and dealings with the public are enumerated, and it is urged that more attention should be given to the details of preparing bulletins and circulars that will make a direct appeal, that personal letters of enquiry should receive a personal reply, and that a knowledge and use of good English and a good literary style should be cultivated.

Ball (E. D.). **Courses for the Post-graduate Student of Entomology.**—*Jl. Econ. Ent.*, xvi, no. 2, pp. 182–185. Geneva, N.Y., April 1923.

A scheme for the ideal training of a future entomologist is outlined.

Kellogg (V.). **Extra-Entomological Studies for the young Entomologist.**—*Jl. Econ. Ent.*, xvi, no. 2, pp. 185–198. Geneva, N.Y., April 1923.

The educational requirements of an entomologist are enumerated, and it is pointed out that the more widely informed he is, and the more soundly and broadly he is educated, the more effective he will be. In particular, he should have some basic training in general zoology and botany, systematic, morphological and physiological, should know something about chemistry, should be able to read French and German, and should be able to speak and write good English.

Stearns (L. A.) & Hough (W. S.). **Spreader Tests on Apples and Peaches.**—*Jl. Econ. Ent.*, xvi, no. 2, pp. 198–201. Geneva, N.Y., April 1923.

In preliminary tests during one season with spreaders and adhesives in spray solutions for use on apple and peach trees, the materials used were both proprietary compounds, a prepared casein spreader and a prepared flour-paste spreader. Neither substance increased the effectiveness of the spray solution in protecting fruit or foliage from insects and diseases, and it is doubtful whether such a spreader would pay for the increased cost of the spray. Nicotine sulphate 40 per cent. and the casein spreader were found to be uncongenial.

Smith (R. H.). **Spreaders in Relation to Theory and Practice in Spraying.**—*Jl. Econ. Ent.*, xvi, no. 2, pp. 201–207. Geneva, N.Y., April 1923.

Though much emphasis has been placed on the use of the mist or fog type of spray, this is not considered very satisfactory in actual practice. High-power spraying gives better results, but the film spray, obtained by the use of a spreader, gives the same uniform covering with low-pressure or high-pressure sprayers, though the high-pressure is the more efficient and economical. Experiment has shown that substances with very low surface tensions, such as saponin and soaps, produce spreading and film formation, but the film deposit of spray material is so thin, at least in the case of lead arsenate, that its efficacy is doubtful. Caseinates give a thicker and more durable film deposit than these substances; calcium caseinate causes a rapid fixation of the liquid film, and with this substance it may be possible to govern the thickness of the film deposit according to various requirements.

Soaps, such as are commonly used with nicotine sprays, and also sodium caseinate, tend to increase the amount of soluble arsenic in arsenical compounds and to lessen the stability of combined sprays. Calcium caseinate does not appear to have any of these defects. Miscible oils are good spreaders and possess certain additional qualities that commend their use with dormant sprays, but incompatibility with sulphur and Bordeaux compounds, as well as with arsenicals, is a great drawback to their practical use.

Tests made in Idaho in 1920–21 indicate definite improvement in control of codling moth [*Cydia pomonella*] by means of calcium caseinate with lead arsenate, and it was found possible to omit the second cover spray without impairing effectiveness. Calcium caseinate in a combined spray of lead arsenate and nicotine sulphate also gave much better results against *Aphis pomi*, DeG. (green apple aphis) and *Eriosoma lanigerum*, Hausm. (woolly apple aphis).

BRITTON (W. E.). **Rapid Spread of the Apple and Thorn Skeletonizer, *Hemerophila pariana*, Clerck.**—*Jl. Econ. Ent.*, xvi, no. 2, pp. 207–209. Geneva, N.Y., April 1923.

Hemerophila pariana, Clerck (apple and thorn skeletoniser), of which previous accounts have been given in Canada and New York State [*R.A.E.*, A, vi, 22; vii, 27] has been spreading rapidly, particularly in Connecticut, and causing browning of the foliage of apple. It apparently passes the winter in the adult stage, and spreads chiefly by the moths moving in the direction of the prevailing winds.

FLINT (W. P.). **Shall we change our Recommendations for San José Scale Control?**—*Jl. Econ. Ent.*, xvi, no. 2, pp. 209–215. Geneva, N.Y., April 1923.

Experiments during 1920–22 in the control of San José scale [*Aspidiotus perniciosus*, Comst.] in Illinois have confirmed the results obtained in Indiana [*R.A.E.*, A, xi, 302], lubricating oil emulsion giving nearly as good control of the scale as miscible oil and a much higher degree of control than was obtained with the best grades of liquid lime-sulphur. The percentages of living scales found 47 days after treatment with various insecticides are as follows: Scalecide (1 : 15), less than 0·5; Spra-mulsion (1 : 15), 0·4; Diamond paraffin potash fish-oil soap emulsion (2 per cent.), 1·5; Junior Red Engine potash fish-oil soap emulsion (2 per cent.), 7; commercial liquid lime-sulphur (32° Bé., 1 : 8), 11; soluble sulphur, Niagara (15 lb.: 50 U.S. gals. water), 18·5; dry lime-sulphur (15 : 50), 41; control (no treatment), 50·4. As the thorough spraying with liquid lime-sulphur in the experimental plots resulted in 11 per cent. of the scale remaining active after the dormant spray, it is evident that a more effective material is required. Thousands of gallons of home-made lubricating oil emulsion have been used in the orchards of southern Illinois during the last few years with very satisfactory results, and at rather less than half the cost of the dilute commercial liquid lime-sulphur spray as supplied ready for application to the tree.

HYSLOP (J. A.). **Insect Pest Survey Work in the United States.**—*Jl. Econ. Ent.*, xvi, no. 2, pp. 215–221. Geneva, N.Y., April 1923.

The insect pest survey work in the United States is reviewed, and an account is given of the Insect Pest Survey Bulletin [*R.A.E.*, A, x, 98].

The results obtained from the publication of the data collected are discussed ; it is considered that they should assist in elucidating the reasons for the cyclic appearance of insect pests, the gradual shift of regions of destructive abundance, the limiting barriers to normal dispersal and the directive influences that determine the paths of insect diffusion, and the relation of climate, geography, topography and geology, as well as biological complexes of fauna and flora, to insect distribution and abundance.

CLAUSEN (C. P.). U.S. Bur. Ent. **The Citricola Scale in Japan, and its Synonymy.**—*Jl. Econ. Ent.*, xvi, no. 2, pp. 225–226. Geneva, N.Y., April 1923.

A study of the pests of *Citrus* in Japan has been made for the purpose of securing parasites for use in California. Among the species of *Coccus* examined were several individuals that bore a striking resemblance in colour and form to the citricola scale of California ; and further study of the question led to the conclusion that *Coccus citricola*, Campb., is a synonym of *Coccus* (*Lecanium*) *pseudomagnoliarum*, Kuwana. The distribution of this scale includes the entire range of the citrus belt in the main islands of Japan. *Poncirus trifoliata* is the preferred food-plant, but it has also been observed on pomelo and orange. The life-history and habits as observed are identical with those recorded in California. The Californian infestation is almost undoubtedly of Oriental origin, but there is some doubt as to whether Japan is the native home of the species.

FELT (E. P.). **Powder-post Beetles** (*Lyctus* **spp.**) **and Automobiles.**—*Jl. Econ. Ent.*, xvi, no. 2, p. 226. Geneva, N.Y., April 1923.

Powder-post beetles (*Lyctus* spp.) have recently damaged the wood and upholstering of motor-cars, as well as the woodwork of houses in New York City. The trouble in every case has been due to the use of sapwood, which should be treated with some preservative before being used. The only method of later treatment is by heat, and this, though it kills the insects, does not prevent reinfestation.

VAN ZWALUWENBURG (R. H.). **Tachinids and Sarcophagids established in Mexico.**—*Jl. Econ. Ent.*, xvi, no. 2, p. 227. Geneva, N.Y., April 1923.

The introduction is recorded of *Euzenilliopsis diatraeae*, Towns., and *Sarcophaga sternodontis*, Towns., which are parasitic on *Diatraea saccharalis*, F., into the west coast region of Mexico from Cuba for the purpose of controlling *D. lineolata*, Wlk.

Horticultural Inspection Notes.—*Jl. Econ. Ent.*, xvi, no. 2, pp. 236–239, 1 plate. Geneva, N.Y., April 1923.

Among the pests intercepted by State and Federal inspectors at the United States ports, many that are not known to occur in the country have been repeatedly discovered on fruit and rose stocks from abroad. Such are pupae of *Acronycta auricoma*, F. (dagger moth), on fruit and rose stocks from France ; nests of *A. rumicis*, L. (sorrel cutworm),

on fruit stocks from France; nests of the Pierine butterfly, *Aporia crataegi*, L., on rose stocks and on pear and cherry seedlings from France; *Emphytus cinctus*, L., on rose stocks from England, France and Holland; and *Notolophus (Orgyia) antiquus*, L. (European tussock moth), on pear seedlings from France. All these were intercepted between 1st January and 24th February 1923.

ALDRICH (J. M.). **Two Asiatic Muscoid Flies Parasitic upon the so-called Japanese Beetle.**—*Proc. U.S. Nat. Mus.*, lxiii, Art. 6, no. 2474, 4 pp. Washington, D.C., 1923.

Ochromeigenia ormioides, Towns., and *Centeter cinerea*, gen. et sp. n., both reared from *Popillia japonica*, Newm., in Japan are described. *O. ormioides* also occurs in Java. *C. cinerea* is so common in Japan that 700 puparia have been sent to New Jersey, and there seems a good prospect that it will become established. *O. ormioides* is larviparous, and *C. cinerea* oviparous.

DICKSON (B. T.). **Raspberry Mosaic and Curl.**—*Sci. Agric.*, iii, no. 9, pp. 308–310. Ottawa, May 1923.

The literature on raspberry mosaic and leafcurl is reviewed [*cf. R.A.E.*, A, x, 244, 459]. Everything at present points to *Aphis rubiphila* as the transmitter of the former. Attempts to spread the disease by pruning have not yet been successful. All rubbish from pruning should be removed so that Aphids may not be able to pass to other canes, and digging and removal should be carefully done so that they are not shaken off during the process. The work of Rankin shows that *A. rubiphila* is undoubtedly the infecting agent in leafcurl.

HASEMAN (L.) & SULLIVAN (K. C.). **Controlling San José Scale with Lubricating Oil Emulsion.**—*Missouri Agric. Expt. Sta.*, Circ. 109, 4 pp., 2 figs. Columbia, Mo., February 1923.

Oil emulsion is only recommended where liquid lime-sulphur has not proved effective in controlling San José scale [*Aspidiotus perniciosus*], and not because it is cheaper, as the fungicidal properties of lime-sulphur enhance its value to the orchard. The following formula is recommended: 1 U.S. gal. paraffin lubricating oil, 1 lb. potash fish-oil soap and ½ U.S. gal. soft water. These should be brought to a vigorous boil, and while still hot passed through a force pump at least twice under a minimum pressure of 60 lb.; ordinary stirring is not sufficient. The emulsion will keep indefinitely if it is not allowed to freeze, which occurs at about 18° F. A 2 per cent. solution of oil will give efficient results, so the emulsion is used at the rate of 3 gals. to 100 gals. of water. Wherever possible, soft water should be used; ½ U.S. gal. water containing ¼ lb. copper sulphate and ¼ lb. lime will soften 50 U.S. gals. of water and prevent the breaking down of the emulsion. Where lime-sulphur has been previously used in a spraying machine the tank and pump should be thoroughly washed out, preferably with hot water and lye, before the oil emulsion is used, as lime-sulphur will break down the emulsion. The lubricating oil emulsion spray can be used as a dormant spray on all deciduous fruit-trees. Every particle of twig, limb and trunk of the tree should be covered with the spray. On the average a tree 18–20 years old will require from 6 to 10 U.S. gals. of spray.

AUBERTOT (M.). **Sur la dissémination et le transport de Nématodes du genre *Rhabditis* par les Diptères.**—*C. R. hebdom. Acad. Sci.*, clxxvi, no. 18, pp. 1257–1260. Paris, 30th April 1923.

When some *Drosophila* spp. were placed in jars containing potatoes mashed with vinegar, it was found that in a few days there was a mass of larvae of the Nematode, *Rhabditis pellio*, on the surface of the potato. As all risk of direct infection had been carefully excluded, the larvae must have been introduced by the flies. They probably become attached to flies, or other insects, when the carrier lays its eggs or feeds in infested material.

MACGILL (E. I.). **The Life-history of *Aphidius avenae* (Hal.), a Braconid parasitic on the Nettle Aphis** (*Macrosiphum urticae*).—*Proc. R. Soc. Edinburgh, 1922–23*, xliii, pt. 1 (no. 4), pp. 51–71, 13 figs. Edinburgh, 1923.

Macrosiphum urticae, Kalt., is widely distributed in the British Isles. It occurs on the stinging nettles, *Urtica dioica* and *U. urens*, and on *Geranium robertianum*, *Malva sylvestris*, and *Chelidonium majus*. It is plentiful up to the early part of December and reappears again at the end of February and early in March. In mild winters it continues to reproduce viviparously, and in such a case oviparous females do not appear throughout the year.

Aphidius avenae, Hal., is a very constant parasite of this Aphid. It has also been recorded from *Siphonaphis padi*, L. (*Aphis avenae*, F.), *Aphis scabiosa*, Kalt., *A. myosotidis*, Koch, *A. crataegaria*, Wlk., *Macrosiphum* (*Siphonophora*) *rubi*, Kalt., and *Siphocoryne xylostei*, Schrank. The distribution of the parasite is given, with a description of all stages. There are several generations in one season. The winter is passed as a last-stage larva, inside the cocoon, and the first adults emerge about the middle of March, shortly after the reappearance of the Aphids. The complete life-cycle occupies about 28 days, so that, as the parasites continue to be active until the end of November, there may be as many as 7 or 8 generations in a season. Mating occurs immediately after emergence, and if no males are present, the female lays her eggs, though the author has not found that these develop. A single male may mate with several females. It has been stated that an *Aphidius* never attacks an Aphid for the second time, but the author has seen one *M. urticae* attacked at least ten times by *A. avenae*, and generally the same individual is attacked 3 or 4 times. If Aphids are examined after oviposition of the parasite, they are usually found to contain at least two, and often more, eggs of *A. avenae*.

The economic status of this parasite is reviewed. From August to January the percentage of parasitism was about 33, rising in March to 57 and in April to 83, showing that the parasite is an important check on the increase of numbers of the Aphids in the early part of the year when the plants are young and Aphid attacks would have the most serious consequences.

SCHULZE (P.). **Eriophyina. Gallmilben.** [Gall Mites.]—*Biol. Tiere Deutschlands*, Teil 21, pp. 52–60, 5 figs. Berlin, 15th March 1923.

This paper on gall mites forms part of a general treatise on the biology of the fauna of Germany [*R.A.E.*, A, xi, 199].

GURNEY (W. B.). **A Poison Bait for the Common Black Ant.**—*Agric. Gaz. N.S.W.*, xxxiv, pt. 4, p. 256. Sydney, 1st April 1923.

A bait that was reputed to have been effective in America against the Argentine ant [*Iridomyrmex humilis*] [*R.A.E.*, A, viii, 285] has lately been successfully employed against the domestic ant, *I. rufoniger*, in New South Wales.

CLAYTON (E. S.). **To Control the Monolepta Beetle on Cotton.**—*Agric. Gaz. N.S.W.*, xxxiv, pt. 4, p. 280. Sydney, 1st April 1923.

Monolepta rosea is proving a serious pest of cotton on the north coast, and has also been observed eating the silk of maize, and on orchard trees, mulberry, introduced pepper, and native teak. The following method has been effective for its control. A bag is tied loosely to a long handle, soaked in kerosene and ignited, and carried slowly between the rows of cotton at night, two or three persons keeping close to the operator and shaking the adjacent bushes. The beetles will be found in communities and should be located before dark and after it with the flare. When shaken off the bushes they fly through the flame and fall to the ground. If the beetles are thoroughly established, the flare may have to be used for two or three consecutive nights. This method should be equally effective in orchards. Coconut beetles, feeding on the under surface of palm leaves, have been dealt with in the same way in the New Hebrides.

FROGGATT (W. W.). **The Banana Aphis** (*Pentalonia nigronervosa*, **Coquerel**).—*Agric. Gaz. N.S.W.*, xxxiv, pt. 4, pp. 296–297, 1 fig. Sydney, 1st April 1923.

The literature on *Pentalonia nigronervosa*, Coq., is briefly reviewed. A great deal of importance is attached to this Aphid in the Tweed River district, as it is claimed that its presence indicates that the infested banana will later on be attacked by "bunchy top," a disease that causes much damage to this crop on the northern rivers of New South Wales and in Southern Queensland. It is also claimed that, if it is eliminated by spraying with kerosene emulsion, or some other reliable mixture, the plants will not develop the disease. The author is very doubtful whether Aphid infestation is the direct cause of the disease, and considers that other causes, such as climatic conditions, cultivation, soil, etc., contribute to its development.

TRABUT (L.). **Le Figuier.**—*Bull. agric. Algérie-Tunisie-Maroc.*, xxix, no. 4, pp. 49–60, 18 figs. Algiers, April 1923.

An account is given of the bionomics of *Blastophaga* and its rôle in the pollination of figs.

SCHINDLER (A.). **Liste des Ennemis de l'Olivier observés au Maroc pendant les années 1921 et 1922.**—*Bull. Soc. Sci. nat. Maroc*, ii, no. 7–8, pp. 138–139. Rabat, 30th December 1922. [Received 22nd May 1923.]

In view of the considerable development of olive plantations in Morocco, a list is given of the pests that have been observed on the trees up to the present. They include an unidentified species of *Aleurodes*; *Chionaspis ceratoniae*, March. (not very numerous); and *Aspidiotus hederae*, Vall., living in numerous colonies and causing deformation of

the fruit. *Aspidiotiphagus citrinus* is a parasite which, together with the Coccinellid, *Chilocorus bipustulatus*, L., greatly reduces the number of *Aspidiotus*. Unfortunately *C. bipustulatus* is largely parasitised also, so that its value is much reduced. *Saissetia* (*Lecanium*) *oleae*, Bern., is troublesome on account of the sooty fungus that follows its attacks; its numbers are, however, considerably reduced by an undetermined parasite and a predacious Lepidopterous larva. *Euphyllura olivina*, Costa (*Psylla oleae*, Först) and *Prays oleellus*, F. (*oleae*, F.) are abundant in certain regions, but the worst pest is *Dacus oleae*, Rossi. Adults have appeared at very variable dates—in September, October, January and March, and biological studies are being continued with a view to remedial measures. Two individuals of *Opius concolor*, Szèpl., have been reared, and if these parasites are found to develop normally in Morocco, they should prove very useful. Damage due to *Otiorrhynchus* sp. has been noticed, but no adults have been found. *Limobius borealis*, Payk., *Mecinus comosus*, Boh., and a probably new species of *Tychius* have been found in the young trunks.

DE JOANNIS (J.). **La lutte contre les insectes nuisibles.**—*Var. scient. Soc. Sci. nat. Maroc*, i, no. 2, 57 pp. Rabat, 1st July 1922. [Received 22nd May 1923.]

In this paper, which was originally published in 1917, an account is given of a few well-known pests, some of which occur in Morocco and others of which the introduction is to be feared. Examples of successful control of insect pests by biological and other methods are reviewed.

PAILLOT (A.). **Quatrième campagne de lutte contre la Cheimatobie par les ceintures gluantes.**—*C. R. Acad. Agric. France*, ix, no. 16, pp. 439–443. Paris, 1923.

Experiments carried on over a period of four years have shown that *Cheimatobia brumata* and *Hybernia defoliaria* begin to ascend the trees about 8th November in normal years in the Lyons region, about one week later in the warmer regions of Drôme and Isère, and about a fortnight earlier in the fruit-growing regions of the East. Sticky bands should be applied to the trees before the average date of the beginning of emergence of the moths in normal years. It has recently been found that, besides the American tanglefoot, there are mixtures of French make that are equally good for the purpose. They should be applied direct to the bark, in a band 2–2½ in. wide and about 2 in. thick. In cases of heavy infestation the bands should be renewed while the insects are ascending the trees, by passing a wooden scraper with an indented edge over them.

KEHRIG (H.). **La Protection des Oiseaux.**—*Rev. Zool. agric. & app.*, xxii, no. 1, pp. 1–5, 1 fig. Bordeaux, January 1923. [Received 24th May 1923.]

This article advocates bird protection, and points out that the French Ministry for Education has recommended school associations with this object.

FEYTAUD (J.). **La Biologie du Phylloxéra de la Vigne.**—*Rev. Zool. agric. & app.*, xxii, no. 1, pp. 5–14, 6 figs. Bordeaux, January 1923. [Received 24th May 1923.]

The biology of *Phylloxera* as here described is based on the results of various workers on the subject.

TROUVELOT (B.). *Laspeyresia molesta* **Busck. (Nouvelle chenille mineuse des pêchers et des pêches.)**—*Rev. Zool. agric & app.*, xxii, no. 1, pp. 14–22, 2 figs. Bordeaux, January 1923. [Received 24th May 1923.]

This article on *Cydia* (*Laspeyresia*) *molesta* is substantially the same as one already noticed from another source [*R.A.E.*, A, xi, 44].

KLEINE (R.). **Die Anfälligkeit bzw. Widerstandsfähigkeit einzelner Hafersorten gegen den Befall durch** *Oscinis frit*, **L.** [The Susceptibility or Resistance of particular Varieties of Oats to Attack by *Oscinella frit*.]—*Zeitschr. Schädlingsbekämpfung*, i, no. 1, pp. 2–12, 10 figs. Berlin, April 1923.

Diptera are serious pests of cereals in Germany. *Hylemyia coarctata*, Fall., is responsible for winter injury, while summer crops are attacked by *Chlorops* spp. and *Oscinella* (*Oscinis*) spp., *Chlorops* being, however, of no importance in northern Germany owing to the low temperatures.

Oats are the crop that suffers chiefly from *O. frit*, L. It has three annual generations, a fact that has led to sowing at such dates as either avoid injury or reduce it. This practice fails in years that are abnormal as regards weather, etc. In the course of tests with 58 different varieties of oats, 3 were found to be most resistant and 11 others to suffer average losses only. The data available are not, however, sufficient to indicate the susceptibility of the various kinds in the different stages of their development.

PRIESNER (H.). **Die Larven der gelben** *Thrips*-**Arten (Thysanoptera).** [The Larvae of the yellow Species of *Thrips*.)—*Zeitschr. Schädlingsbekämpfung*, i, no. 1, pp. 16–20, 11 figs. Berlin, April 1923.

Thrips tabaci, Lind., is the only yellow species of which the larva is well known. None of the others has been recorded as a pest except *T. flavus*, Schrank, mentioned by van Eecke as causing injuries similar to those by *T. tabaci* and *T. physapus*, L. The author found *Achillea millefolium* infested by *T. nigropilosus*, Uzel, and there is a possibility of cultivated plants being attacked. The larvae are different from those of *T. tabaci*. Second-stage larvae of *T. tabaci* and both stages of those of *T. nigropilosus*, *T. flavus* and *T. alni*, Uzel, are described, with a key to the second stages of the four species. *T. alni* was taken from alder (*Alnus incana*), the leaves of which showed traces of injury in the form of brown spots.

v. LENGERKEN (H.). **Ist der Rapsglanzkäfer** (*Meligethes aeneus*, **Fabr.**) **ein positiver Schädling?** [Is the Rape Beetle, *M. aeneus*, a positive Pest?]—*Zeitschr. Schädlingsbekämpfung*, i, no. 1, pp. 29–31. Berlin, April 1923.

Investigations on *Meligethes aeneus*, F., are briefly reviewed, and the conclusion is reached that the larva is not a positive pest. The adult beetle appears to be injurious to rape under certain conditions. If the plants are in full bloom when the hibernated adults feed in spring, only the pollen is taken, but if the plants are backward the closed buds are pierced, or eaten entirely if of small size. The object of this paper is to draw attention to the need for ascertaining definitely the economic importance of *M. aeneus* in the various rape-growing regions of Germany.

Börner (C.). **Neue Aufgaben der Reblausforschung.** [New Problems of *Phylloxera* Research.]—*Zeitschr. Schädlingsbekämpfung*, i, no. 1, pp. 32–38, 1 plate, 4 figs. Berlin, April 1923.

The investigations already made on *Phylloxera* are reviewed. The author's collaborator, Dr. Thiem, discovered in 1922 that Austria is a region where both the northern or German form and the south European form of this Aphid [*R.A.E.*, A, x, 617] occur. The possibility of the northern form being found in Italy, Sicily and southern France may explain many discrepancies in existing literature. Like Austria, the Mediterranean region may be regarded as a mixed territory. The author then noted structural differences, described here, between the northern form and the southern form, which was found in Austria. As a result the northern form—hitherto called *P. pervastatrix*—is now named *P. vastatrix* (*pervastatrix* being treated as a synonym), while the southern form is named *P. vitifolii*. The biological differences in the behaviour of the two forms may explain the difference in the behaviour of the roots of American and European vines towards infestation. It is known that American resistant vines are infested only as regards the younger roots, and that the Aphids disappear in autumn and winter, owing—according to Couderc and Grassi—to their having changed during the summer to nymphs and adults, which produce the sexed individuals on the aerial parts of the plants. Dr. Thiem finds that the southern form (*P. vitifolii*) appears to behave in this manner on vines that are susceptible to it and not resistant or immune. Of these vines only Riparia×Rupestris 101/14 and Rupestris H.G.9 were attacked (partly on the leaves and partly on the roots) by the northern form (*P. vastatrix*). It was found that no increase of nymphs occurred in summer, and that the roots were more or less strongly infested in autumn by young winter Aphids. This is the typical infestation of the European vine. Any clearance of the Aphid from the roots later on was due to the death of the young individuals, and not to the change into nymphs. In Dr. Thiem's experiments with the southern form the disappearance of the insects in autumn seems due to the change into nymphs, showing that this form (*P. vitifolii*) retains its biological pecularity in its root stage also on vines immune from the northern form. If it should be shown in future experiments that the European vine, when infested by *P. vitifolii*, is chiefly attacked in the younger roots and is freed through this change, it becomes clear that *P. vitifolii* is only a pest of secondary importance, and that *P. vastatrix* is the really important one as regards viticulture. Measures against it would resolve themselves into a choice of stocks absolutely immune from its attack. It may be possible, perhaps, to obtain stocks that are also unsuitable to *P. vitifolii*.

Hedicke (H.). **Zur Kenntnis der Cynipiden der Fritfliege.** [A Contribution to the Knowledge of the Cynipids of the Frit Fly.]—*Zeitschr. Schädlingsbekämpfung*, i, no. 1, pp. 38–40. Berlin, April 1923.

The synonymy is given of *Cothonaspis* (subgen. *Hexaplasta*) *hexatoma*, Hartig, including *C. fuscipes*, described in a paper recently noticed [*R.A.E.*, A, xi, 203]. *Eucoila eucera tristis*, Htg., and *E. wildhami*, Kurd., mentioned in the same paper, are synonyms of *E.* (subgen. *Rhoptromeris*) *eucera*, Htg. Both these Cynipids were bred from *Oscinella frit*.

BÖRNER (C.). **Ueber die Nahrung der jungen Maikäferengerlinge.** [On the Food of young May Beetle Larvae.]—*Zeitschr. Schädlingsbekämpfung*, i, no. 1, p. 40. Berlin, April 1923.

The newly hatched larvae of *Melolontha* appear to require from the very beginning living plant tissue such as is everywhere available in the sites preferred for oviposition. The assumption that they can subsist on humus was not borne out.

FOLSOM (J. W.). **Entomology with special reference to its Ecological Aspects.**—3rd revd. edn., 8vo, vii+502 pp., 5 pls., 308 figs. Philadelphia, P. Blakiston's Son & Co.; London, John Murray, 1923. Price 21*s*. net.

This book is a valuable one to the student of entomology who requires a good foundation in general principles, and more especially in the biological side of the subject.

In the present edition a new chapter on Insect Ecology (pp. 348–409) includes a resumé of the available data on the influence of environment on insects—a field that should yield results of paramount value to the economic side of entomology.

The bibliography, now occupying 48 pages, is arranged, as in the earlier editions, by subjects, and chronologically within each subject, and has been thoroughly revised; titles of obsolete works have been omitted, and those of some 250 more modern contributions to the literature have been incorporated.

Extension of European Corn Borer Quarantine.—*U.S. Dept. Agric., Fed. Hortic. Bd.* Washington, D.C., 26th March 1923, 2 pp.

Regulations supplemental to Notice of Quarantine no. 43 (second revision) [*R.A.E.*, A, x, 595] are amended to include new areas of invasion of the European corn borer [*Pyrausta nubilalis*, Hb.].

WEIGEL (C. A.). **Insect Enemies of Chrysanthemums.**—*U.S. Dept. Agric.*, Farmers' Bull. 1306, 36 pp., 2 tables, 33 figs. Washington, D.C., 23rd February 1923. [Received 23rd May 1923.]

Notes are given on the bionomics and control of chrysanthemum pests, of which some of the most important are *Diarthronomyia hypogaea*, Löw., *Phlyctaenia ferrugalis*, Hb. (*rubigalis*, Guen.), *Trialeurodes vaporariorum*, Westw., *Tetranychus telarius*, L., *Macrosiphoniella sanborni*, Gill., *Rhopalosiphum rufomaculata*, Wils., *Heliothrips haemorrhoidalis*, Bch., *Lycophotia margaritosa*, Haw., *Orthezia insignis*, Dougl., *Saissetia hemisphaerica*, Targ., *Pseudococcus citri*, Risso, and *P. adonidum*, L. Formulae recommended for various insecticides against these pests are also given.

SNODGRASS (R. E.). U.S. Bur. Ent. **The Resplendent Shield-bearer and the Ribbed-cocoon-maker. Two Insect Inhabitants of the Orchard.**—*Smithsonian Rept., 1920*, pp. 485–509, 3 plates, 15 figs. (Pubn. no. 2641.) Washington, D.C., 1922. [Received 22nd May 1923.]

Coptodisca splendoriferella (resplendent shield-bearer) has one generation a year in the extreme northern parts of its range and several in the southern parts. In southern New England and New York it has two, the first brood of adults appearing in May and the second in August.

Eggs are laid on apple, and the hatching larvae eat through the bottom of the eggs and tunnel directly into the interior of the leaf, feeding on the soft tissues. The majority of the spring generation mature at the end of July, when they cease feeding. They then make cases of material cut from the leaves; these cases are attached to the twigs, and pupation takes place within them. At this season only about two weeks elapse between the cutting of the cases and the appearance of the adults. The hibernating caterpillar survives in its case and pupates in the spring, about the end of April in southern New England. Only a small percentage of the autumn brood of larvae escapes destruction by natural enemies. *Cirrospilus flavicinctus*, Riley, inserts an egg, probably in the body of the larva itself; the resulting larva does not destroy its host until it has spun a cocoon. The parasitic larvae pupate in early spring within the case. The summer cases are infested with *Closterocerus tricinctus*.

Bucculatrix pomifoliella also feeds on apple. The adults emerge in the first part of May in southern New England and in New York State, but are earlier farther south; they deposit eggs on the leaves, usually on the lower, but sometimes on the upper, surface. These are said to hatch in 6–10 days. The larva mines in the leaves for about eight days, when it leaves its mine and moults under a cocoon of silk. After the first moult it feeds in the open. The larvae of the spring brood mature from the end of July to the end of August in southern New England, and then pupate in cocoons. The moths lay eggs that produce a late summer and autumn brood, and these larvae are more numerous, and the damage they do becomes particularly noticeable by early autumn. The first to mature in southern New England spin their cocoons in early September, and others feed till almost the end of October. The cocoons are usually spun on the twigs, branches or trunk of the tree.

A very detailed account is given of the life-history of both these moths. *C. splendoriferella* occurs only occasionally in such numbers as to make it a pest, and late summer sprays with arsenicals are usually sufficient to keep *B. pomifoliella* in check, though winter washes of lime-sulphur or miscible oil are also recommended for killing the hibernating pupae in their cocoons.

SNYDER (T. E.). U.S. Bur. Ent. **A new *Glyptotermes* from Porto Rico.**—*Proc. Ent. Soc. Wash.*, xxv, no. 4, pp. 89–94, 1 plate. Washington, D.C., April 1923.

Glyptotermes corniceps, sp. n., is described from Porto Rico, where its habit of working in dry wood is similar to that of *G. pubescens*, Snyder, which also occurs in the island.

This termite might easily be imported into the United States in furniture, etc., and might prove very destructive, as it would probably survive in the Southern States.

ALDRICH (J. M.). **A new parasitic Fly bred from the Bean Beetle.**—*Proc. Ent. Soc. Wash.*, xxv, no. 4, pp. 95–96. Washington, D.C., April 1923.

The Tachinid, *Paradexodes epilachnae*, sp. n., has been reared from the larvae of *Epilachna corrupta*, Muls., in Mexico. Attempts have been made to introduce this fly into Alabama.

LUTMAN (B. F.). **An Outbreak of Hopper Burn in Vermont.**—*Phytopathology*, xiii, no. 5, pp. 237–241, 1 fig. Lancaster, Pa., May 1923.

The seriousness of hopper-burn in potatoes as compared with physiological tip-burn depends on the character of the weather. In dry, hot periods the sunlight may remove 30 to 50 per cent. of the foliage in a week, but during a wet season the bulk of the injury is of insect origin. The early descriptions of tip-burn undoubtedly dealt only with the physiological form, and the introduction of the leaf-hopper [*Empoasca mali*], which apparently spread eastward from the western States, has introduced a new factor into the problem. The earlier views of Ball [*R.A.E.*, A, vi, 489; vii, 278; viii, 311], that the injury was partly mechanical in the destruction of the veins and partly physiological in the withdrawal of water from the cells, is probably more nearly correct than that of Eyer [*R.A.E.*, A, x, 544], who believes that some toxin is injected by the leaf-hopper.

SMITH (L. B.). **Feeding Habits of the Japanese Beetle which influence its Control.**—*U.S. Dept. Agric.*, Bull. 1154, 11 pp., 3 figs., 3 tables. Washington, D.C., 30th April 1923.

Serious difficulties have been encountered in attempting to control *Popillia japonica*, Newm. (Japanese beetle), by using poisonous materials on its food-plants, and this is partly due to the concentration of the insects on plants that for economic reasons it is difficult to spray. It has been recorded as attacking 210 species of plants, and the degree of infestation is variable. The beetles are strongly attracted to ripening fruit, and early apples and peaches may be seriously injured. In the early part of the season they are more abundant on weeds, cherries and grapes; by midsummer fruit and shade trees are more heavily infested, while in August and September severe infestations are confined to maize, beans, clover and various plants in bloom at the time.

Most of the feeding occurs on the upper and outer foliage, especially when it is exposed to the direct rays of the sun. The greatest activity occurs at a temperature of 38°–39° C. [about 101° F.]. Usually the females enter the soil late in the afternoon, and after depositing 1–5 eggs, emerge the following morning. Some remain two or three days in the soil before emerging. In the early part of the day beetles tend to concentrate on low-growing plants such as smartweed and beans. As the heat increases during the day they become more active and disperse to taller plants, when they may be abundant on elms, oaks and maples, returning towards the ground after 3 p.m. The proportion of females to males was highest between noon and 2 p.m. and lowest between 7 p.m. and 7 a.m. There are indications that many females remain among low weeds during the night and do not enter the soil. Data are given on the length of time spent by the beetles in feeding on various plants and on the rate at which they consume the foliage.

MUÑOZ-GINARTE (B.). **Consideraciones sobre el cultivo de la piña en Cuba.** [Notes on the Cultivation of the Pineapple in Cuba.]—*Bol. Agric. Ind. Com. Guatemala*, ii, nos. 2–3, pp. 71–83, 100–118. Guatemala, February–March 1923. [Received 22nd May 1923].

This paper has already been noticed from another source [*R.A.E.*, A, x, 55].

CORBETT (G. H.). **Preliminary note on the two-coloured Coconut Leaf Beetle** (*Plesispa reichei*, **Chap.**).—*Malayan Agric. Jl.*, xi, no. 3, pp. 64–69. Kuala Lumpur, March 1923.

A general description is given of all stages of *Plesispa reichei*, Chap., which is an important pest of the coconut palm generally distributed throughout Malaya. The larva and adult feed on the lower and upper surfaces of the leaves. If the attack has been severe or of long duration the palms die. It is essentially a pest of seedlings in the nurseries and young palms in the field up to two or three years of age. In older plants the damage is not of such importance on account of the more extensive leaf surface. This Hispid has been collected on trees of 8, 10 and 13½ years of age, and on an old tree at least 50 ft. high, but in all cases the trees appeared to have suffered from some previous injury or were growing in unhealthy conditions. The only other palm on which this beetle has been found is *Ortheodoxa regia*. The beetles can fly, and they avoid light. The number of the females is slightly in excess of the males. The time elapsing before a newly emerged female deposits eggs varies from 28–58 days, and a female after first mating takes from 7–10 days to produce eggs. The average incubation period is 7·46 days, the largest number of eggs laid by an individual female being 112 in 249 days. The average duration of the larval stage is 33·1 days. The pupal stage lasts 6–11 days. Newly hatched larvae take an average of 39·7 days to reach the adult stage.

A Chalcid egg parasite has recently been found, but preliminary observations indicate that the eggs are not highly parasitised; breeding work shows that the time elapsing between the parasite laying an egg in the egg of the Hispid and emergence of the adult may be eight days. It is important that nurseries should be made either in an empty space with shade or under trees other than coconuts. Before leaving the nurseries whole seedlings should be immersed in 4 lb. lead arsenate to 100 gals. of water. If the plants have been subjected to a heavy rain after the first immersion, it may be necessary to immerse them again before planting out, or if planted out, to spray them so as to kill the young larvae that have hatched from eggs since the first immersion. When the beetles are present on young palms in the field, an application of this spray well into the centre of the palms once every three weeks will probably be found cheaper and more effective than hand collection.

It was formerly considered that all Hispids were leaf miners, but further observations have shown that the larvae of *Bronthispa froggatti*, *Plesispa reichei*, and *P. nipa*, Maul., live on the epidermis of the leaf. Other Hispids known to be injurious to the coconut palm are *Promecotheca cumingi*, Baly, in the Philippines, *P. reichei*, Baly, in Samoa, *P. coeruleipennis*, Blanch., in Fiji, *P. antiqua*, Weise, in New Guinea and the Solomon Islands, and *B. froggatti*, Sharp, in the Solomon Islands.

BALLARD (E.). *Platyedra gossypiella*, **Saund., the Pink Bollworm in South India, 1920–21.**—*Mem. Dept. Agric. India*, Ent. Ser. vii, no. 10, pp. 171–193, 3 plates, 7 tables. Pusa, March 1923.

These investigations into the habits of *Platyedra gossypiella*, Saund., for 1920–21 are a continuation of those started in 1919 [*R.A.E.*, A, x, 154]. The damage due to *P. gossypiella* was about 4 per cent. between February and May, and 18·7 per cent. in July, or a little less than half the total green boll infestation. The examination of an entire crop from a four-acre field showed a loss of 11 per cent. due to pink

bollworm, and 3 per cent. to *Earias* spp. Tables are given showing the amount of food required by the larvae for development. Not more than three seeds are required to feed a larva, the average being about two. There seems to be little doubt that long-cycle larvae do not occur in South India. The numbers of *Earias* spp. in a field are much less than *P. gossypiella*, and an individual larva does far more damage than one of the latter. Figures are given showing how much the shedding of buds and young bolls is due to these two pests, and the increase in green boll infestation in various districts is shown in tables. The enforcement of the Pest Act has been attended by good results, and it should be continued.

BALLARD (E.). **An Account of Experiments on the Control of** *Siga (Schoenobius) incertellus* **in the Godavari Delta.**—*Mem. Dept. Agric. India*, Ent. Ser., vii, no. 13, pp. 257–275, 5 figs., 9 tables. Pusa, April 1923.

Schoenobius (Siga) incertellus is one of the most persistent pests of rice; it is always found in the Oriental region wherever rice is grown, and is estimated to cause an annual loss of 10 per cent. of the entire Indian rice crop. *Spodoptera mauritia* does more damage when it appears, but is more sporadic in its habits and is generally limited to one time of the year. The programme of investigations on *S. incertellus* carried out in the Godavari Delta in 1920–21 is given, together with records of the infestation in plots selected for estimating the attack on the whole area for different seasons, of the number of broods in the year, and of the proportion of spent to gravid females caught.

The method of rejecting attacked seedlings at the time of transplanting gives some hope of constituting an effectual control of *S. incertellus*, and close cutting used in conjunction with this should destroy a large proportion of the early and the last generation of the moth. Burning the stubble was not found to be practicable, but should be tried again. No food-plants other than rice have yet been found. An undetermined Chalcid parasite has been bred from the egg masses. At the time of transplanting the majority of larvae found were still not nearly ready for pupation, and the figures obtained give some indication that a high percentage of potential moths is destroyed by the process of seedling selection. The larval life is about 3–4 weeks. The efficacy of light traps is doubtful. Further research is needed into the wild food-plants of this moth, the degree of parasitism, the possibility of the existence of immune varieties of rice, and the extent to which stubble helps the insect to tide over the time between the crops.

FLETCHER (T. B.). **Note on Identification of** *Siga incertellus*, **Wlk.**—*Mem. Dept. Agric. India*, Ent. Ser., vii, no. 13, pp. 276–278. Pusa, April 1923.

Notes are given on the synonymy of *Schoenobius incertellus*, which has been described under many specific names. As regards the generic name, the author states that according to Hampson *Schoenobius* is antedated by *Siga*, Hb. [Mr. W. H. Tams, of the British Museum, informs us that the above use of the name *Siga* is due to a misapprehension, since Hampson does not state that *Siga* and *Schoenobius* are congeneric, but merely that *Siga* is the older name, this being his sole reason for changing the name of the subfamily from SCHOENOBIINAE to SIGINAE.—*Ed.*]

LEE (H. A.) & MERINO (G.). **The Prevention of the Importation of Injurious Insects and Parasitic Fungi on Economic Crops from Foreign Countries.**—*Philippine Agric. Rev.*, xiv (1921), no. 4, pp. 389–401. Manila, 1922. [Received 22nd May 1923.]

Most of the information given in this paper has already been noticed in two previous ones [*R.A.E.*, A, ix, 173, 174], and the regulations governing the plant quarantine service of the Philippines, the importation of abaca (*Musa textilis*) and other plants of the genus *Musa*, coconut plant (*Cocus nucifera*), tobacco (*Nicotiana tabacum*), sugar-cane and rice and untreated materials of these plants, and the importation of fruits from countries infested with *Ceratitis capitata* (Mediterranean fruit fly) are given, together with a list of fruits prohibited from entry.

LEE (H. A.) & MEDALLA (M. G.). **The Season's Experiments on Fiji Disease, Mosaic Disease and Smut of Sugar Cane.**—*Philippine Agric. Rev.*, xiv (1921), no. 4, pp. 402–412, 8 plates. Manila, 1922. [Received 22nd May 1923.]

Experiments on sugar-cane mosaic disease seem to indicate that it is perpetuated almost entirely by careless selection of seed, and that the amount of transmission from diseased to healthy stools is very small. Repeated experience under various seasonal conditions will, however, be necessary to warrant the conclusion that insect and other possible methods of aerial transmission are very minor factors.

LEE (H. A.) & KOPKE (E. W.). **Mosaic Disease of Sugar Cane in the Philippines.**—*Philippine Agric. Rev.*, xiv (1921), no. 4, pp. 418–421, 5 plates. Manila, 1922. [Received 22nd May 1923.]

Mosaic disease of sugar-cane is here described and illustrated in order that planters may easily recognise it. The history of the disease in the Philippines is reviewed, and knowledge concerning the cause of the disease and the losses due to it are recorded. Cane points should only be selected from healthy stools.

WOODWORTH (H. E.). **Injury to Citrus by Scale Insects in the Philippines.**—*Philippine Agric. Rev.*, xiv (1921), no. 4, pp. 435–439, 1 graph. Manila, 1922. [Received 22nd May 1923.]

Complete notes are available only on *Coccus viridis*, Green. This Coccid was selected because of its great variation in seasonal abundance, its susceptibility to parasitic fungi, the high percentage parasitised during certain seasons, and its general distribution and omnivorous habits.

The primary or direct injury from scale-insects in the Philippines is the loss of plant juices, damage to the fruit by the fungi associated with them being of little importance there. Normal plants show no serious effects when cultural conditions are good and sufficient moisture is present in the soil, unless the scales appear in overwhelming numbers. The heaviest infestation occurs through the driest part of the year, and, at the same time, in the warmest season. The period of effectiveness of parasitic fungi is only in the rainy season; they appear on new scales and become effective from August to November, the numbers

then fall off until in March some newly parasitised scales are found. *Coccophagus* sp. and *Aneristis* sp. were bred from *Coccus viridis* and are the principal insect parasites affecting this species. The highest percentages of parasitism were recorded from July to October, while the period of maximum scale abundance and injury was from March to June. Spraying or fumigation is therefore a necessary supplement to the natural checks as they now occur.

Plant Pests Control Division.—*21st Ann. Rept. Bur. Agric., Philippine Agric. Rev.*, xv, no. 4, pp. 350-357, 2 plates. Manila, 1922. [Received 22nd May 1923.]

Locust infestation gradually increased during 1921. The use of white arsenic, mixed with rice bran and other substances, such as lemons and molasses, was adopted, but the results have not yet been reported.

Minor coconut pests were *Promecotheca cumingi*, which was attacked by parasites, and *Thosea cinereomarginata*, which was controlled by three Hymenopterous parasites and one Dipteron.

The plant pest inspection service is of great importance, and special care is being taken to intercept *Aspidiotus perniciosus* (San José scale), which was found on pears from Japan. A number of other plant pests and diseases were intercepted on various plant materials, a great number of which have not yet been found in the Philippines.

The most widely prevalent rice pests during the year were *Prodenia litura* and *Spodoptera mauritia*. *Leptocorisa acuta* also occurred.

Uye (T.). [**New Aphids.**]—*Insect World*, xxvii, no. 1, pp. 3–5, 1 plate. Gifu, 15th January 1923.

Descriptions, in Japanese, are given of *Toxoptera rhododendroni*, sp. n., from *Rhododendron indicum* var. *kaempferi*; *T. shichito*, sp. n., from *Cyperus malaccensis*; *Macrosiphum lonicerae*, sp. n., from *Lonicera japonica*; and *Aphis soyogo*, sp. n., from *Ilex pedunculosa*, *Thea japonica* and *Eurya japonica*.

Seurat (L. G.). **Histoire Naturelle des Nématodes de la Berbérie. Première Partie. Morphologie, Développement, Ethologie et Affinités des Nématodes.**—221 pp., 34 figs. Algiers, 1920. [Received 24th May 1923.]

The contents of this publication are indicated by its title.

The Plantations Preservation Decree, 1922.—Proclamation no. 23. Zanzibar, 14th August 1922. [Received 24th May 1923.]

All clove and coconut plantations must be cleaned at least once a year, and kept free from decaying vegetable or other matter likely to afford breeding-places for insect pests, including the rhinoceros beetles, *Oryctes monoceros* and *O. boas*. Dead trees and shrubs and those attacked by any insect or parasite must be destroyed to the satisfaction of an inspector, who may carry out any provisions not complied with at the occupier's expense.

The Plantations Preservation Decree, 1913 [*R.A.E.*, A, i, 235], and The Plantations Preservation (Amendment) Decree, 1917, are repealed.

KÉLER (S.). **O masowym pojawie sówki sosnówki** *Panolis griseovariegata* **Goeze w lésnictwie Ruda nadleśnictwa L.P. Grajewo.** [On the Abundance of *P. flammea*, Schiff., at Grajewo.]—*Polsk. Pismo Ent.*, ii, pt. 1, pp. 41–45. Lwów, 1923. With a Summary in German.

Panolis flammea, Schiff. (*griseovariegata*, Goeze), was unusually abundant in the early summer of 1922 in Poland. Over 33 acres of thirty-year-old fir trees were defoliated, and the injured trees will probably die. The moth was heavily parasitised by a Tachinid, *Tachina ferva*, L.; another natural enemy is the fossorial wasp, *Ammophila sabulosa*, L.

Other injurious forest insects are *Porthetria* (*Liparis*) *dispar*, L., *Ips typographus*, L., *I. sexdentatus*, Börn., *Myelophilus piniperda*, L., *M. minor*, Hart., and *Hylobius abietis*, L.

SPEYER (E. R.). **Report of the Entomologist.**—*8th Ann. Rept.*, 1922, *Exptl. & Res. Sta. Cheshunt*, pp. 45–57. Cheshunt, Herts, 1923.

Observations both inside and outside glasshouses indicate that *Tetranychus telarius*, L. (red spider) hibernates in the adult stage, and that neither the eggs nor any immature stages can survive the winter months, even if the food-plants are constantly at hand. With the heating of houses early in the year some adults may come out of hibernation and lay eggs on young cucumber plants, but the resulting larvae do not mature. It is thought that adults that lay their eggs early in the year are unable to do so later ; if this is the case, any drastic control on young pot-plants is to be deprecated.

Fumigation with chlorine, nitrogen tetroxide, carbonyl sulphide, hydrogen disulphide, selenuretted hydrogen and carbon bisulphide gave negative results. Hydrogen cyanide and cyanogen iodide anaesthetised the mites. Sulphuretted hydrogen was the only gas tested that had an appreciable effect in killing them when concentrations varying between 1 volume of gas in 1,500 of air and 1 volume of gas in 200 volumes of air were used. When increasing quantities of the gas were generated in a house of 1,000 cu. ft. space, it failed to produce the expected action on the mite, and was entirely innocuous to the cucumber plants. It therefore appears that sulphuretted hydrogen disappears from the atmosphere too rapidly to allow of sufficient concentration in so large an air space. Formic acid and ethyl mercaptan had no effect on the mite, and amyl nitrate and tetrachlorethane acted only temporarily. Methyl nitrite and chloropicrin had a permanent effect, but only in concentrations that caused considerable damage to the plants. It was noticeable that, with the exception of formic acid and ethyl mercaptan, the adults of whitefly [*Trialeurodes vaporariorum*] were killed by all gases and vapours used.

The bionomics and control of the Mycetophilid flies, *Pnyxia scabiei*, Hopk., and *Plastosciara perniciosa*, Edw., which did considerable damage to cucumbers, have already been noticed [*R.A.E.*, A, xi, 136].

Fumigation experiments with tetrachlorethane showed remarkable variations in the susceptibility of certain plants to injury by it. When fumigating with amyl nitrite and amyl nitrate, Chironomid larvae of the genus *Orthocladius* came to the surface of the soil in cucumber pot-plants and were killed. It is probable that fusel oil, which contains a great quantity of amyl alcohol and which is soluble in water, exercises a similar influence on these larvae. The latter is less injurious to plants

than the two compounds previously named. Another similar case was experienced with tomato seedlings, in the stems of which *Camptocladius* larvae were living.

The following species of woodlice are pests under glass, *Armadillidium speyeri*, Jackson, and *A. pictum*, Br., infesting cucumbers, and *A. vulgare*, Lat., *Porcellio laevis*, Lat., and *Haplophthalmus danicus*, B. Lund, infesting tomatos. *A. speyeri* gnaws the stems, cropping the cotyledons of tomato seedlings in seedboxes up to a week after germination, but leaves cucumber seedlings at this age alone. When tomato seedlings have reached a height of 6 in. they are not attacked. The true food of this species, and probably of most others, is cellulose in a state of fermentation, and they feed chiefly at night, but are active in the day at a temperature of 60° F. Brief notes are given on the bionomics of *A. speyeri*, *A. pictum*, and *A. vulgare*.

Woodlice are easily killed by hot water. For winter treatment the borders should be cleared out and the surface flooded with water to drive the woodlice to the surface, and then sprayed with 8 lb. potash soft soap (household), 1 gal. cresylic acid (pale straw 97–99 per cent.) and ½ lb. pure naphthaline. These should be heated till the soap is melted and the naphthaline dissolved, and for spraying 2 pints should be used to every 12 gals. water. Experiments with poison baits showed that substances containing soluble bichromates were the most satisfactory, but in practice a bait consisting of 10 parts oatmeal, 2 parts glucose, 1 part potassium bichromate and 10 parts water was only slightly successful, as it did not appear sufficiently attractive. Fermented straw in inverted flower-pots is more attractive than unfermented, and the addition of glucose increases the attraction. The addition of potassium or calcium bichromate makes the straw distasteful. In a given area it was found that the number of woodlice decreases with persistent pot-trapping.

Cruz Lapazaran (J.). **La langosta en la región aragonesa.** [Locusts in the Aragon Region.]—*Hoja Agric. Popular*, v, no. 47, pp. 299–300, 4 figs. Barcelona, March 1923.

Much could have been done to check the impending locust outbreak in Aragon, if the fields where oviposition had occurred had been ploughed before November, as this would have destroyed about 80 per cent. of the eggs. In loose soil it is necessary to plough to a depth of 8 in., but a depth of 5 in. is sufficient in firm soils such as contain 50 per cent. of clay.

Cabanyes Salazar (J.). **El arañuelo o cabra del olivo.** [*Phloeothrips oleae*.]—*Hoja Agric. Popular*, v, no. 47, pp. 302–303. Barcelona, March 1923.

Of 17 insecticides tested against *Phloeothrips oleae*, a proprietary compound containing nicotine gave the best results. It should be sprayed on the olive trees in the morning or evening at the period when the insects are of a black colour.

Rohwer (S. A.). **New Hymenoptera from the Malayan Region.**—*Philippine Jl. Sci.*, xxii, no. 4, pp. 345–355, 1 fig. Manila, April 1923.

Among the new species dealt with are the Chalcids, *Dirhinus banksi* and *D. luciliae*, said to be parasitic on *Lucilia* sp., and the Braconids, *Bassus cylasovorus* and *Microbracon cylasovorus*, said to be parasitic on *Cylas turcipennis*.

KUWANA (I.). **The Chinese White-wax Scale,** *Ericerus pela*, **Chavannes.** —*Philippine Jl. Sci.*, xxii, no. 4, pp. 393–405, 2 plates. Manila, April 1923.

A description is given of all stages of *Ericerus pela*, Chavannes. At the end of August the scale is very conspicuous on the branches of *Fraxinus bungeana* var. *pubinervis*, growing on the paths between the rice-fields about Tokyo. There is one generation a year. The first female larvae appear about 15th June from eggs laid some two months previously beneath the mother, where they usually remain for a few days after hatching. They then crawl into the leaves and become attached to the upper surface. In a month the first moult occurs, after which they move to the branches, settling mostly on young twigs. They remain in this stage till the end of August or early September, and after the second moult, the adult stage is reached. The male larvae emerge a few days after the females and settle in clusters on the lower surface of the leaves, descending to two- or three-year-old twigs and settling on the underside after the first moult. After the second moult the larva is transformed to a pre-pupa, and in four or five days the third moult takes place and the pupa appears. On emergence mating occurs, and the male dies shortly after. Eggs are laid about the middle of April; the greatest number laid by a single female recorded by the author was 15,028 and the smallest 3,372.

The food-plants recorded in Japan are *Chionanthus retusens*, *Fraxinus bungeana* var. *pubinervis*, *F. longicuspis*, *Ligustrum ibota*, *L. japonicum* and *L. medium*. Other authors have recorded the following natural enemies: *Brachytarsus niveovariegatus*, Roelofs, and a Cecidomyiid, which attack the female scale; *Chilocorus similis*, Rossi, and *C. tristis*, Fold., which attack the larvae; and *Encyrtus* sp.

Ericerus pela is not cultivated in Japan for the purpose of wax production. The raw wax product is commonly used as a polish of furniture and other woodwork. In western China the production of white insect wax has been an important industry for centuries.

MACKENZIE (J. M. D.). **Report on Work done between 17th October 1921 and 31st March 1922 on the Beehole-borer Investigation.**—*Burma Forest Bull.*, no. 7 (Ent. Ser. no. 1), 14 pp. Rangoon. 1923.

This report is a continuation of a previous one [*R.A.E.*, A, x, 178]. An outstanding feature of the investigation on the beehole-borer of teak, *Duomitus ceramicus*, Wlk., is the low incidence in the last year or two as compared with that of 1914–18, and the generally fluctuating nature of the attack, especially in the older areas, for reasons that are not fully understood. In the younger plantations woodpeckers appear to have a definite influence, as they can easily reach the larvae. The limit of size of tree into which the bird is able to bore to reach the larva appears to be 6 in. diameter or 20 in. girth, that is, up to about 15 years of age, though after that age the birds still capture the borers in the tops and branches. Other enemies that reduce the number of borers to some extent are a small black ant, a Tachinid that is apparently parasitic, an Ichneumonid (probably a Campoplegid, close to *Angitia*), which generally attacks larvae at a height of more than 6 ft. from the ground, probably during June and July, and which seems to be an important check, and a Chalcid, which is not numerous and may be a hyper-parasite.

Observations on felled trees indicate that August felling should kill all larvae present. Theories regarding other factors affecting the incidence of the pest are only tentative. The hypothesis that the larger the tree is the heavier will be the infestation seems to be borne out, and other things being equal, the longer a tree is exposed to attack, the greater seems to be the number of attacks for that tree. Inconclusive evidence was obtained regarding trees situated near to roads, density of the crop and admixture with other species, though one method of minimising attack seems to be to thin early and heavily and to underplant. There is some evidence that fires reduce the incidence of the moth, though it is not clear how this comes about. Isolated plantations are apparently less attacked than those surrounded by older teak in mixed forests. Observation tends to bear out the existing idea that low rainfall is accompanied by low borer incidence.

Other damage noted was due to three different species of Lamiids, including *Apomecyna* sp., and *Nupserha* sp., probably *N. variabilis*, Gahan, but the damage at present is not serious. The last-named forms galls in the larval stage in the creeper, *Thunbergia grandiflora*, and can therefore be prevented from boring in teak by the removal of all creepers from teak in clearings before December. As the plantation becomes more dense the creepers seem to die out naturally. Other pests were *Caloclytus* sp.; *Gelonaetha hirta*; *Haplohammus cervinus*; a larva, probably a Dynastid or Lucanid, that caused swellings in young teak trees; an Arbelid, perhaps *Arbela tetraonis*; and the Curculionid, *Alcides ludificator*, which occurred in considerable numbers in the pith without affecting the timber.

In searching for other food-plants of *Duomitus ceramicus* several of their borings were found in *Premna* sp., and larvae believed to be those of *D. leuconotus* were found in *Cassia fistula*. The toon shoot borer [*Hypsipyla robusta*] was found in all plantations containing *Cedrela toona*; and the shothole borers, *Platypus solidus*, *Xyleborus interjectus*, *X. submarginatus* and *X. velatus* were found in a living teak tree in a patch without bark.

HUTSON (J. C.). **The Cotton Leaf Caterpillar:** *Cosmophila erosa.*—*Trop. Agric.*, lx, no. 3, pp. 159–161. Peradeniya, March 1923.

The larvae of *Anomis* (*Cosmophila*) *erosa*, Hb., eat large holes in cotton leaves in Ceylon, but fortunately they prefer the older leaves. Vigorous and well-grown plants can therefore sustain fairly bad attacks. Pupation occurs within the folds of the leaves. In the infestation studied the larvae of the first generation had evidently originated on the malvaceous weed, *Abutilon graveolens*, which was found growing along the borders of the plots, and the resulting moths had laid many eggs on the young cotton plants early in November. Many of the cotton plants round the edges of the plots had been infested by the larvae from adjacent weeds, with the result that they were more seriously attacked than those in the centre.

Remedial measures include collecting the larvae and cocoons by hand into tins containing a little kerosene and water. The plants may be dusted with a mixture of Paris green and powdered lime or wood ashes (1–40 or 1–60), applied by means of small muslin or fine mosquito-net bags; or sprinkled with a mixture of $\frac{1}{2}$ oz. Paris green and 4 gals. water, to which has been added a handful of lime to neutralise any soluble arsenic. The mixture can be sprinkled on the bushes by means of small bunches of leafy twigs, and should be constantly stirred.

Natural enemies include small parasitic flies and wasps. In the recent outbreak large numbers of birds, including mynahs, were observed feeding on the larvae. Clean cultivation should be practised, especially during the first few weeks after planting. The land should be well cultivated and manured before sowing, as vigorous plants are more likely to recover from attacks.

Friederichs (K.). **Verslag van den Entomoloog over het tijdvak 1 Januari 1922 tot 31 December 1922.** [Entomologist's Report for the Period 1st January to 31st December 1922.]—*Meded. Koffiebessenboeboek-Fonds*, no. 7, pp. 149–153. Soerabaya, April 1923.

The various points relating to the coffee berry borer [*Stephanoderes hampei*] have been dealt with in the preceding parts of this publication. Van Davelaar's method [*R.A.E.*, A, x, 507, 602; xi, 169] is valuable for facilitating inspection for checking purposes, and may be used as a preventive measure for berries growing near heavily infested plantations or near estate buildings. The problem of disinfecting berries in the buildings (so as to prevent beetles from flying back to the coffee plots) has been solved in practice by treating them with steam [see below].

Friederichs (K.). **Verdere mededeelingen over de schimmel** *Botrytis stephanoderis.* [Further Communications on the Fungus, *B. stephanoderis*.]—*Meded. Koffiebessenboeboek-Fonds*, no. 7, pp. 154–159. Soerabaya, April 1923.

Further experiments with *Botrytis stephanoderis* [*R.A.E.*, A, xi, 169, 237] show that it is not feasible to increase the fungus infection artificially by distributing spores, and that it is not possible to promote conditions unfavourable to the coffee-berry borer [*Stephanoderes hampei*] and favourable to the fungus. The great mortality on the Karang Redjo estate (which raised hopes of using the fungus) was due to an unusual increase of the borer owing to the extraordinary number of over-ripe, fallen berries, resulting from abnormally delayed plucking, and also to a contemporaneous natural increase of the fungus.

Friederichs (K.) **Ontsmetting van aangeboorde koffiebessen met kokend water of stoom.** [The Disinfestation of bored Coffee Berries with Boiling Water or Steam.]—*Meded. Koffiebessenboeboek-Fonds*, no. 7, pp. 160–164. Soerabaya, April 1923.

Coffee growing near estate buildings and near the collection centres in a plantation is particularly heavily infested by the coffee-berry borer [*Stephanoderes hampei*], owing to beetles escaping from infested berries. The most recent method of counteracting this is the use of steam or boiling water. Small quantities of fallen berries have been treated in a contrivance in which two kerosene tins are used, one above the other. The berries are placed in the upper one—which has a bottom of wire gauze, and are steamed by boiling water in the lower one. A development of this method is dipping the berries for a few minutes in tanks of boiling water, thus killing all stages of the borer. One method of doing this is to place the berries in a bucket with a perforated bottom. A metal plate is laid on the berries to prevent them floating, and the bucket is then hung in boiling water for about 1½ minutes. In severe infestations an entire sackful may be dipped, sack and all. In this case 2½–3 minutes are required. Dipped berries dry quicker than undipped

ones, so that the capacity of the berry drying plant is increased. If the berry pluckers are equipped with bags of twill there is no chance of the beetles escaping in the interval between plucking and dipping at the estate factory.

Overzicht van de literatuur betreffende den Koffiebessenboeboek, behalve de in de Mededeelingen van het Koffiebessenboeboek-Fonds verschenen publicaties. [List of the Literature on the Coffee Berry Borer excluding the Publications of the Coffee Berry Borer Fund.]—*Meded. Koffiebessenboeboek-Fonds,* no. 7, pp. 169–171. Soerabaya, April 1923.

The title of this list indicates its nature.

EHRHORN (E. M.). **Reports of Chief Plant Inspector, December 1922 and January 1923.**—*Hawaiian Forester & Agriculturist,* xx, no. 1, pp. 18–22. Honolulu, January–March 1923.

The pests intercepted in December 1922 and January 1923 included: from California, *Rhizoglyphus hyacinthi* in bulbs and *Pseudococcus maritimus* on pears; from Ohio, red spider on roses; from China, *Parlatoria pergandei* and *Pseudaonidia trilobitiformis* on pomelos, and *Rhopalosiphum* sp. on *Caladium*; from Japan, *Cremastogaster laborisa*, a Dermestid beetle, Lepidopterous larvae and ants on *Paulownia* logs, *Pseudococcus comstocki* and *Lepidosaphes ficus* on sand pears [*Pyrus sinensis*], and *Pseudaonidia trilobitiformis, Parlatoria pergandei, Hemichionaspis aspidistrae* and *Lepidosaphes* sp. on citrus fruit; and from Syria, *Aspidiotus cydoniae*, on cuttings of *Hibiscus*.

PETTEY (F. W.). **A new Species of Psyllid.**—*S. African Jl. Nat. Hist.*, iv, no. 1, pp. 30–33, 1 fig. Pretoria, January 1923.

Trioza merwei, sp. n., which has been known for some years as a minor pest of *Citrus* in the Transvaal, Natal and the eastern district of Cape Province, is described from both sexes collected on orange and *Toddalia lanceolata* in Natal.

BEVIS (A. L.). **A Lepidopteron parasitic on a Coccid.**—*S. African Jl. Nat. Hist.*, iv, no. 1, pp. 34–35. Pretoria, January 1923.

A description is given of the Eucosmid, *Coccothera spissana*, Zell., which was found parasitising a species of *Ceroplastes*, differing from *C. ceriferum*, the common form found at Durban. Although most of the Coccids contained several larvae, some as many as seven, apparently only a few matured, occasionally three, but usually only one, empty pupa case being observed for each scale.

SANDGROUND (J.). **A Note on the Occurrence of** *Aphelenchus phyllophagus* **in Chrysanthemums in the Transvaal, with Suggestions for its Control.**—*S. African Jl. Sci.*, xix, pp. 233–235. Johannesburg, December 1922.

Aphelenchus phyllophagus, Stewart, has been recorded in the Transvaal on chrysanthemums, and has apparently been introduced from Europe. The Nematode probably survives in the leaves in the winter, and they should be systematically destroyed by burning, and even on the plant they should be removed as soon as infection becomes evident. A spray of 1 oz. dilute potassium sulphide to 4 gals. water was found very effective. The plants should be sprayed once a week, taking care to spray the lower surface, and after heavy rain it is advisable to

repeat the spray. These results differ from those obtained by Stewart when this Nematode was first recorded in England in 1921 [*R.A.E.*, A, ix, 426].

HARDENBERG (C. B.). **Economic Entomology in Moçambique, and its Problems.**—*S. African Jl. Sci.*, xix, pp. 285–291. Johannesburg, December 1922.

The importance of entomology in Mozambique is very great, owing to the potential wealth of the country in its agricultural development. In the northern Provinces the chief damage to cotton is caused by the weevils, *Apion constrictum*, Hartm., *A. consimile*, Wagn., and *A. considerandum*, Fhs. *Dysdercus* has been recorded, but in some localities its place is taken by another bug, *Callidea dregei*. An undetermined Scarabaeid is present in large numbers in sugar plantations, and the presence of various species of Bostrychids, for the greater part not previously recorded from this locality, and of Platypodids, which are nearly all new to science, is an unwelcome sign of potential future injury. The Province possesses magnificent forests containing very valuable timber, but it is urgent that investigations should be made into the insects that infest them before it is too late. To deal effectively with these various problems a thorough entomological survey should be made conjointly with a botanical survey. Life-history investigations of the pests should also be made, in order to ascertain whether artificial or biological control is advisable.

PATTERSON (W. H.). **Notes on some of our Cocoa Pests.**—*Jl. Gold Coast Agric. & Comm. Soc.*, ii, no. 2, pp. 95–102, 6 plates. Accra January–March 1923.

A number of posters dealing with the chief pests of cacao in the Gold Coast are being prepared for distribution among the growers, and in the meantime some of them are reproduced here on a small scale, together with a brief popular account of the insects concerned, including the bark sappers, *Sahlbergella singularis* and *S. theobromae* [*R.A.E.*, A, ii, 670], *Helopeltis bergrothi* (cacao mosquito) [*R.A.E.*, A, ii, 671; iii, 661] and *Heliothrips rubrocinctus* (cacao thrips).

COTTERELL (G. S.). **The Biological Control of Insect Pests of Crops.**—*Jl. Gold Coast Agric. & Comm. Soc.*, ii, no. 2, pp. 103–111. Accra January–March 1923.

In the Gold Coast artificial methods of control of insect pests seem to be out of the question owing to cost, lack of co-operation among farmers and the neglect of ordinary cultural practices. The importance of biological control is therefore obvious, and an account is given of what has been accomplished in other countries in this respect.

SCHINDLER (A.). **Dégats causés aux cultures marocaines par les chenilles d'*Ocnogyna baetica*, Ramb. var. *meridionalis*, Seitz.**—*Bull. Soc. Sci. nat. Maroc*, iii, no. 1–2, pp. 21–22. Rabat, 1st March 1923.

The Arctiid, *Ocnogyna baetica* var. *meridionalis*, which has been known for a long time in Morocco as an inhabitant of uncultivated land, where it attacks the low herbage, has recently been invading cultivated crops in large numbers, and is doing considerable damage to flax, beans, peas, turnips and forage crops. It is thought that the larvae causing the injury are all of this species, though there is considerable variety in colour and the adults have not all been reared. So many

parasites were obtained from the insects examined last year that it was hoped that the numbers would be very considerably reduced, but the colonies seem to be but little diminished, and it is suggested that trenches should be dug around the threatened fields, so that the invading insects can be burnt or crushed. Tobacco powder, which is easily obtainable in Morocco, and arsenicals might also be used with advantage.

JOLLY (G.). **La culture du Pois du Cap à Tuléar.**—*Rev. Bot. app. & Agric. colon.*, iii, no. 20, pp. 270–271. Paris, 30th April 1923.

Phaseolus lunatus is the chief crop grown by the natives in the province of Tuléar in the South of Madagascar. Its principal pests are a small black Aphid, which does much harm to the stems and flowers, and a Bruchid beetle, which may infest the seeds to such an extent as to make export impossible. The fumigation of warehouses with sulphur dioxide is suggested against this pest.

BOURDIN (A.). **Etude-enquête sur la Cheimatobie, ses moeurs, sa destruction.**—32 pp. [pamphlet]. Paris, Maison rustique, 1922. (Abstract in *Rev. Bot. app. & Agric. colon.*, iii, no. 20, p. 286. Paris, 30th April 1923.)

The winter moth, *Cheimatobia brumata*, L., is increasing in France, though it is not yet so serious a pest as in Germany. The measures now adopted include banding with an adhesive or with wire gauze; barriers enclosing the tree trunk, and either smeared with tar along the top edge or fitted with an edge of smooth zinc over which the females cannot pass; sprinkling the ground with a mixture of soot and ashes, which kills the larvae that drop to pupate; stamping the earth to prevent the emergence of the adults; and arsenical sprays.

Natural enemies include toads, birds and two Hymenopterous parasites, *Microgaster sessilis* and *Masicera flavicans*.

YOTHERS (M. A.) & VAN LEEUWEN (E. R.). U.S. Bur. Ent. **Codling Moth Control in Rogue River Valley.**—*Better Fruit*, xvii, no. 11, pp. 7–8 & 20–24, 1 fig. Portland, Oreg., May 1923.

The bionomics of the codling moth [*Cydia pomonella*] are briefly recorded, with spray schedules for this pest on apples and on pears. Spreaders may be used with advantage; a miscible oil has been found efficient at the rate of 1½ per cent., but calcium caseinate, 1 lb. to 200 U.S. gals., is cheaper than oil and is as effective.

LOVETT (A. L.). **Eradication of Vegetable Insects.**—*Better Fruit*, xvii, no. 11, pp. 10–11 & 16. Portland, Oreg., May 1923.

A general outline is given of a definite programme of control against various vegetable pests. Attention is called to the advantages of calcium arsenate and nicotine dusts, as, in recent years, dusting has been found superior to liquid sprays in the control of vegetable pests.

HERTIG (M.). **The Normal and Pathological Histology of the Ventriculus of the Honey-bee, with Special Reference to Infection with** *Nosema apis.*—*Jl. Parasitology*, ix, no. 3, pp. 109–140, 3 plates. Urbana, Ill., March 1923.

The primary purpose of this paper is a consideration of the pathology of the adult honey-bee, and there has necessarily been included a somewhat extended discussion of the normal histology and cytology. The investigations were made to determine what changes are brought about

in the tissues and cells of the ventriculus by the presence of *Nosema apis*, and to determine what pathological conditions this organ may exhibit in certain disorders not associated with the presence of the parasite.

From the behaviour of infected bees it is seen that the pathological conditions, which are described in detail, do not immediately produce outward symptoms of disease. In a colony known to harbour parasites, it is impossible to distinguish the infected individuals by appearance or behaviour, except those actually dying from the disease. Since in this latter condition the usual symptoms are quite as characteristic of disorders not associated with *Nosema*, microscopic examination is the only certain method of diagnosis. The ultimate pathological effect, namely, the weakening and death of the bee, appears to be due, not to any of the pathological conditions enumerated, but to the collective and cumulative effect of some of them. Until more is known of the physiology of the honey-bee and of insects in general, the most plausible explanation of the conditions, and the one commonly advanced, is that some derangement of the digestive process takes place, which leads to the malnutrition and consequent weakening and death of the host.

An instance is recorded of a pathological condition of the ventriculus not associated with *Nosema*, the cause of which is unknown.

HARTZELL (F. Z.). **Spraying and Dusting Experiments for Pear Psylla in 1922.**—*New York Agric. Expt. Sta.*, Circ. 65, 8 pp., 2 tables. Geneva, N.Y., 1st December 1922. [Received 9th May 1923.]

It is thought that this Psyllid [*Psylla pyricola*] can be controlled by spraying if two thorough applications are made when the insects are in the nymphal stages. All spraying should be done from the ground and from different sides of the tree. The addition of ¾ lb. casein to the formula already noticed [*R.A.E.*, A, x, 326], except that 40 lb. hydrated lime is advised instead of 50, appeared to give a slight increase in control, as the liquid spread better on the bark. Dusting may prove effective if the trees can be enveloped with a sufficient amount of material and all the insects are in the late nymphal or adult stage, but it is variable in its effects, especially in spring, and costs more. Results with liquids depend on the proper time and thoroughness of application. At Geneva sprays containing ¼ to ½ pint of nicotine sulphate to 100 gals., and dusts containing 0·5 to 1 per cent. nicotine, showed a high efficiency. If sprays will not secure control in an average season, and as sprayed trees showed better control than dusted ones in 1922, it cannot be said that dusting will afford protection under epidemic conditions.

PARROTT (P. J.), STEWART (F. C.) & GLASGOW (H.). **Spraying and Dusting Experiments with Apples in 1922.**—*New York Agric. Expt. Sta.*, Circ. 63, 8 pp., 7 tables. Geneva, N.Y., 1st December 1922. [Received 9th May 1923.]

Six applications of lime-sulphur gave complete control against red bug [*Heterocordylus malinus*], though 1·71 per cent. of apples were injured by codling moth [*Cydia pomonella*], and the addition of extra lead arsenate gave approximately the same results. Dusting with sulphur-lead arsenate, 90–10, and nicotine gave complete control in six applications against red bug, 5·68 per cent. of apples being injured by *C. pomonella*. Untreated trees showed 5·27 per cent. and 6 per cent. injury by red bug and codling moth respectively. In other experiments the percentage of apples injured by *C. pomonella*, after dusting with

85-15 sulphur-lead arsenate with sticker, was 1·73, the next best results being obtained with 84–10–6 copper sulphate, lime and calcium arsenate with sticker, and spraying with lime-sulphur. On untreated trees 7·66 per cent. of apples were injured. With the delayed dormant spray against rosy aphis of 25 lb. tobacco dust to 100 U.S. gals. lime-sulphur 1–40, 1·25 per cent. of the apples were injured, and the next best results were obtained with 40 lb. tobacco dust to 100 U.S. gals. sulphur-glue mixture, and ¾ pint nicotine sulphate to 100 U.S. gals. lime-sulphur 1–40. Untreated trees showed a percentage of 32·31 apples injured, and dusting gave poor results compared with spraying. At Geneva spraying with sulphur and glue and sulphur and casein showed a percentage of 0·25 and 0·71 injury by Aphids, and 4·72 and 4·34 by codling moth respectively.

Felt (E. P.). **The Gipsy Moth.**—*Proc. 68th [5th] Ann. Meeting New York State Hortic. Soc.*, pp. 114–116. Rochester, N.Y., 1923.

The gipsy moth [*Porthetria dispar*] is spreading westward from the south of Vermont across Massachusetts and part of the boundary of northern Connecticut, and is threatening an invasion of New York State. The present boundary of this moth in western Massachusetts and the extreme eastern border of New York State is in rough wooded country where control work is exceedingly difficult and costly.

If the moth is allowed to spread throughout New York State, the annual cost of control work, judging by the experience obtained in Massachusetts, will be approximately £1,050,000 (at par). Speaking generally, it is impossible under present conditions to grow most of the more valuable trees to timber size in areas infested by the gipsy moth. The author considers that it is possible to establish a line where the conditions for absolutely holding this pest are most advantageous, and actually maintain a barrier beyond which it shall not be allowed to go.

Thatcher (R. W.). **Investigations with Nicotine Insecticides.**—*Proc. 68th [5th] Ann. Meeting New York State Hortic. Soc.*, pp. 256–266, 1 table. Rochester, N.Y., 1923.

Thatcher (R. W.) & Streeter (L. R.). **Factors which affect the Volatility of Nicotine from Insecticide Dusts.**—*New York Agric. Expt. Sta.*, Bull. 501, 34 pp., 18 tables. Geneva, N.Y., March 1923.

The first paper summarises the investigations, which are detailed in the second, the conclusions reached being given in both.

The literature on this subject is briefly reviewed. The experiments described were undertaken to determine the conditions under which the volatilisation of nicotine from various insecticide dusts takes place most satisfactorily for the purpose of killing insects in orchards and gardens.

The results show that in their relation to other substances that may react upon them, nicotine compounds are analogous to ammonium compounds; the free alkaloid and its hydroxide, carbonate, sulphate, chloride, etc., in their solubilities and their volatility from solutions and from dry dusts are perfectly parallel with free ammonia, ammonium hydroxide, carbonate, sulphate, etc. Therefore, it is possible to predict accurately, from a knowledge of ammonium compounds, how nicotine compounds will react with other agencies and under varying conditions.

In their effect upon the volatility of free nicotine, the various commercial materials that may be utilised in the manufacture of insecticide

dusts may be classified as those that are adsorbent, that is tend to prevent the volatilisation of nicotine, and those that are inert, that is those that have no effect upon the volatility of the nicotine other than to expose large surfaces for its evaporation. The efficiency of all dusts of the latter type in volatilising free nicotine is increased in proportion to the fineness to which they are ground, and is diminished by the presence of moisture, as the latter tends to dissolve the free alkaloid and so prevent its volatilisation.

With commercial extracts of nicotine sulphate, the various common carriers are of three different types in their effect upon the volatility of dusts made from them. The first type, which includes such colloidal substances as kaolin, kieselguhr and talc, are adsorbent; and the second, including the common crystalline powders such as gypsum, sulphur, slate dust, etc., are inert. The third, which includes all the common hydrates and carbonates, calcium hydrate and calcium carbonate being the ones commonly used, are active in that they change the nicotine sulphate into more volatile forms. The change produced by these active carriers is dependent on the presence in the mixture of a small amount of water, such as is usually supplied by the water in the commercial solutions of nicotine sulphate. Too much water reduces the volatility of the nicotine from these dusts by dissolving it, as well as interfering with the dust properties of the mixture.

When tobacco dust is used as the source of the nicotine, none of the common carriers, except calcium hydrate, has any effect upon its volatility. Calcium hydrate, however, does increase the volatilisation of the nicotine from tobacco dust by its action upon the tissues in which the nicotine is held in the tobacco and the conversion of the nicotine that the tissues contain into a more volatile form. This effect is increased by the presence of sulphur in the dust mixture; but in this case heat is generated, and there is danger that the mixture may catch fire.

Calcium carbonate and other carbonates, such as dolomite, or magnesium carbonate, are the most efficient and most easily controlled of the active type of carriers for nicotine sulphate dusts. This is confirmed by the results obtained by Rudolf's working in a different method [*R.A.E.*, A, xi, 82], but contradicts Smith's statement that calcium carbonate has no effect on the volatility of nicotine, though this statement was not supported by experimental evidence [*R.A.E.*, A, x, 286]. Most nicotine dusts will probably be more effective if applied to foliage when it is dry, as the presence of water generally tends to reduce the volatility of the nicotine in the gaseous form, in which it accomplishes its toxic effect upon insects.

Materials containing nicotine may be mixed with other insecticidal and fungicidal dusts without impairing the volatility of the nicotine, except in the case of dusts that contain anhydrous copper sulphate. In the latter case the copper compound takes up the moisture that is necessary to the change of nicotine into its more volatile forms, and the mixture cakes and loses its dust properties if enough water is added to facilitate the proper change in the nicotine. Calcium hydrate and sulphur dusts increase the volatility of nicotine from its compounds very markedly, but the mixtures must be carefully handled to prevent generation of heat to a dangerous degree.

Dusts containing nicotine in its most actively volatile forms lose strength rapidly in storage unless kept in tightly closed containers, completely filled, and even under these conditions some loss of nicotine may be expected if the dust contains either calcium hydrate or calcium carbonate or any similar compound.

HERRICK (G. W.). **Recent Experience in the Control of two old Pests.** —*Proc. 68th* [*5th*] *Ann. Meeting New York State Hortic. Soc.*, pp. 84–100. Rochester, N.Y., 1923.

Experiments in 1921 and 1922 against the peach tree borer [*Aegeria exitiosa*] with paradichlorobenzene are described. With old trees in the autumn varying strengths of ¾ oz., 1 oz. and 1¼ oz. gave 94 per cent. control, and with young trees 95 per cent. control. In the spring, with 1 oz. to a tree, five borers were present in 40 treated old trees, against a minimum of 19 in the untreated trees, and in a younger orchard that was more infested only two were found against 44 in the untreated trees. It seems best, however, to apply the treatment in the autumn, probably during the first week in September, as spring applications do not give uniform results and do not destroy the larvae that appear in August and September from eggs deposited in these months. The application of paradichlorobenzene to trees less than five or six years old is not yet recommended.

The experiments described with mercury perchloride against the cabbage maggot [*Phorbia brassicae*] on radishes and cabbages in 1921, and 1922 have already been noticed [*R.A.E.*, A, xi, 234].

PARROTT (P. J.). **Insect Problems of the Hudson River Valley.**—*Proc. 68th* [*5th*] *Ann. Meeting New York State Hortic. Soc.*, pp. 283–305, 5 tables. Rochester, N.Y., 1923.

The raspberry beetle [*Byturus unicolor*] attacks leaves, unopened blossom clusters and the blossom buds, and thus affects the crop of fruit. Tests show that only a small percentage of the insects on sprayed plants succumbs to arsenical poisoning, and the chief value of spraying lies in its repellent influence. Heavy spraying with lead arsenate or Bordeaux mixture drives the beetles away, but with each day following the treatment the number returning tends to increase. If beetles are numerous, an application of 3 lb. lead arsenate to 100 U.S. gals. water should be made when the first blossom clusters are attacked, followed by two other applications at intervals of four or five days. Bordeaux mixture is not so safe as lead arsenate alone if successive treatments are made at short intervals.

Dusting with various sulphides in powdered form for San José scale [*Aspidiotus perniciosus*] shows that these materials are far from satisfactory.

Calcium arsenate, glue, flour paste and linseed-oil soap are regarded as the most promising materials to secure better spreading and more satisfactory film formation in sprays. Experimentally calcium caseinate displayed very promising properties, such as retarding the reaction between lime-sulphur and lead arsenate, facilitating a more even and complete coating of the surface of the apples and promoting longer suspension of lead arsenate. In the field, however, no marked benefits were secured by its addition to lime-sulphur, either against codling moth [*Cydia pomonella*] or apple scab. Further tests will be necessary before definite recommendations can be made.

COBB (N. A.), STEINER (G.) & CHRISTIE (J. R.). *Agamermis decaudata*, **Cobb, Steiner, and Christie; a Nema Parasite of Grasshoppers and other Insects.**—*Jl. Agric. Res.*, xxiii, no. 11, pp. 921–926. Washington, D.C., 17th March 1923.

Agamermis decaudata, gen. et sp. n., is described. In July 1922 it was noticed that grasshoppers in Virginia were infested by Mermithid

parasites, the greater number of which belonged to this species. A total of 3,332 grasshoppers were examined; they consisted chiefly of *Melanoplus femur-rubrum*, DeG. Infestation by the parasite was found to average 12 per cent., increasing to about 25 per cent. in heavily infested regions. Both sexes were about equally attacked. The parasites begin to leave their hosts by the latter part of August, if not before, and nearly all are out by the 1st October. Once free from the host, they make their way to the soil, and apparently never move again. In 16 sq. ft. of soil examined at a depth of 12 in., 132 were found, or a rate of 359,370 to an acre. Eggs are laid in large numbers, and on an average one female lays at least 5,000. The rate of development is influenced especially by temperature. On hatching in spring the larvae work their way to the surface of the soil and enter newly hatched grasshopper nymphs. Artificially infested grasshoppers containing six or eight Mermithids die in about eight days, and it is doubtful whether a host harbouring more than one parasite ever matures. The ovaries of infested females that do survive are vestigial, and it is likely that the males are also rendered sterile. There is reason to believe that the exit of the parasites always causes the death of the host. The entrance of the larva into the host, though easily brought about experimentally, has not been observed in the field; probably it occurs at night.

HOWARD (N. O.). **The relation of an undescribed species of** *Pestalozzia* **to a disease of** *Cinnamomum camphora*, **Nees & Eberm.**—*Phytopathology*, xiii, no. 1, pp. 47–48. Lancaster, Pa., January 1923. [Received 30th May 1923.]

Investigations have been made recently to determine the relation of fungi to a disease of *Cinnamomum camphora* that seriously threatens the production of raw camphor in the United States. The disease is caused primarily by a thrips, *Cryptothrips floridensis*, Watson. Certain camphor growers, however, regard injury by the thrips as merely incidental to the attacks of a fungus, the latter being the really destructive organism. An undescribed species of *Pestalozzia* was found to be quite constantly associated with injury by the thrips. Moreover, evidence was obtained indicating that the thrips is partly responsible for disseminating the spores of the fungus.

Inoculation experiments, however, conducted in the greenhouse upon camphor plants entirely free from thrips, indicate that, under these conditions at least, this fungus is unable to attack the healthy tissue but develops readily in dead portions of the plant. It appears, then, that it is saphrophytic or, at the most, a weak, wound-parasite upon *Cinnamomum camphora*, and that control of the disease lies in the elimination of *C. floridensis*.

Department of Entomology.—*35th Ann. Rept., 1921–22, Purdue Univ. Agric. Expt. Sta.*, pp. 28–31, 2 figs. Lafayette, Ind., 1922. [Received 30th May 1923.]

The chinch bug [*Blissus leucopterus*] continued to be abundant in many sections of Indiana, but the Hessian fly [*Mayetiola destructor*] was less so than for many years. Further experiments with paradichlorobenzene against the peach tree borer [*Aegeria exitiosa*] have shown no injury even to one-year-old peach trees, and it is felt justifiable to recommend its use for trees under six years of age. The San José scale [*Aspidiotus perniciosus*] continues to be the most important orchard

pest, and many apple orchards were badly damaged and some ruined. *Euthrips tritici* is a new peach pest that made its appearance in threatening abundance in 1921, and injury was even more severe in 1922. In 1921 an important pest of soybeans, hitherto considered to be *Sitona hispidulus* (clover root curculio), have now been determined by the U.S. Bureau of Entomology to be a European species, *S. crinita*, probably a recent importation. The weevil destroys young plants by eating the buds and riddling the foliage, and remedial measures appear to lie in a rotation of crops, which is practicable in this case, since it is not desirable, as a rule, to follow clover with soybeans.

The oyster shell scale [*Lepidosaphes ulmi*] is a common pest of ornamental shrubs and certain shade trees. Heavy infestations may be controlled by spraying with 1 lb. fish-oil soap dissolved in 5 U.S. gals. water, to which is added 1 oz. nicotine sulphate 40 per cent. Spraying must be thorough, and applications should be made about 10 or 14 days after the first larvae hatch.

SEAMANS (H. L.). **How to Foretell Outbreaks of the Pale Western Cutworm in the Prairie Provinces.**—*Canada Dept. Agric.*, Ent. Branch, Circ. 12, 3 pp., 1 fig., 1 map. Ottawa, March 1923.

A brief account is given of *Porosagrotis orthogonia*, Morr., which causes severe losses to grain in the southern sections of Alberta and Saskatchewan. A study of the rainfall records shows that there is a distinct relationship between the number of days in May and June with sufficient moisture to bring the cutworms to the surface and the abundance of cutworms the following year. A comparatively accurate and reliable estimate of cutworm prevalence could be made by checking the number of wet days when it may reasonably be expected that they are moving about on the surface of the soil during the two months. If there are less than 10 such days it is probable that there will be an increase in the number of cutworms the following year. If there are more than 15 such days, little trouble may be looked for from this pest. The amount of rainfall required to bring them to the surface and the length of time they remain there depends on the condition and type of the soil. This method of forecasting should be used in conjunction with the cultural control measures that have already been noticed [*R.A.E.*, A, ix, 541].

TREHERNE (R. C.). **Wireworm Control.**—*Canada Dept. Agric.*, Ent. Branch, pamphlet N.S. no. 33, 6 pp., 3 figs. Ottawa, April 1923.

A brief record is given of the life-history of wireworms. They occur most frequently in poorly drained soil and in pasture lands. Soil fumigation is not recommended under field conditions, owing to the cost and danger of injury to plant growth, but soil treatments with commercial fertilisers are recommended in that they enable plants to outgrow attacks. Trapping the adults and larvae with baits has proved effective in the case of garden crops, but with grain and grass crops cultural methods must be relied on. In Canada it is necessary to apply the baits early in the spring, midsummer applications having proved useless except in bare or fallow land. If potatoes are used in the bait, one surface should be cut, and they should be set in the soil a few inches deep and 10 ft. apart throughout the fields. A piece of stiff wire, piercing the potato and showing above the ground, indicates the position of the bait. They should be removed 5 or 7 days later and dipped in a bucket

of boiling water and reinserted in the soil, or thrown away and fresh potatoes used. The operation should be repeated a week later, after which no further baits need be set during the year. The use of shorts or bran of wheat, rice or maize as a substitute for potatoes has already been noticed [*R.A.E.*, A, vii, 407].

Lucerne, clover, field peas and beans, buckwheat and flax are not subject to attack, and may be safely grown in infested soil for 2 or 4 years. In the wheat-growing districts of the Prairie Provinces intensive summer-fallowing, beginning early in June, is effective, as well as ploughing between 15th May and 15th June. Frequent ploughing and cultivation to prevent the development of self-sown wheat or weeds destroys many wireworms through starvation.

In many parts of British Columbia and the Prairie Provinces *Eleodes* spp. (false wireworms) have been known to cause material damage, especially to potatoes planted on recently broken land. If desired, baits of bran or shorts, to which have been added a small quantity of Paris green or white arsenic, may be set in the soil in furrows; otherwise cultural methods with crop rotation will suffice to keep them under control.

Chardon (C. E.) & Veve (R. A.). **The transmission of Sugar-cane Mosaic by** ***Aphis maidis*** **under field conditions in Porto Rico.**—*Phytopathology*, xiii, no. 1, pp. 24–29, 1 fig. Lancaster, Pa., January 1923. [Received 30th May 1923.]

Aphis maidis is present on various grasses in the sugar-cane fields of Porto Rico; after the weeding of the fields, the Aphids pass to the sugar-cane itself, living in the central whorl of leaves until the weeds reappear. During the time it stays on cane, *Aphis maidis* transmits sugar-cane mosaic from diseased to healthy plants.

Arendsen Hein (S. A.). **Larvenarten von der Gattung** *Tenebrio* **und ihre Kultur (Col.).** [Larvae of the Genus *Tenebrio* and their Breeding.]—*Ent. Mitt.*, xii, no. 2, pp. 121–159, 13 figs. Berlin, 30th April 1923.

In breeding larvae of the genus *Tenebrio* for the purpose of studying genetics and variation, difficulties were experienced in their specific determination, and these increased with the discovery of two new larval varieties of *T. molitor*, one of which is easily mistaken for larvae of *T. obscurus* and *T. syriacus*. The other species dealt with are *T. opacus*, *T. obscurus*, *T. syriacus* and *T. picipes*, and a key to them is given.

With abundant food and suitable temperatures the larval stages of *T. molitor*, *T. obscurus* and *T. syriacus* last 6–8 months, the optimum temperature being between 25° and 27·5° C. [77°–81·5° F.]. At 30° C. [86° F.] larval mortality is increased and metamorphosis is retarded. The adults of *T. opacus* and *T. picipes* live for more than a year, considerably longer than the other species. They mate in spring only, whereas the other species mate throughout the year, and they do not oviposit in late summer, autumn and winter. The optimum temperature for the larvae of *T. opacus* and *T. picipes* is about 10 centigrade degrees [18 Fahrenheit] lower than for the others, and at 25° C.–27·5° C. their mortality increases very greatly. The larval stages of *T. molitor*, *T. obscurus* and *T. syriacus* are shortened at 25°–27° C. [77°–80·6° F.]. At 30·5° C. [89·9° F.] the larval stages are prolonged. The growth

of young larvae of *T. molitor* is remarkably accelerated by a temperature of 30·5° C. In four months the average increase of body-weight was eight times as great as in larvae kept at 27·5° C. It is thus apparent that larval growth does not have the same optimum temperature as the duration of the larval period.

HABERMEHL (H.). **Beiträge zur Kenntnis der palaearktischen Ichneumonidenfauna.**—*Konowia*, i, pts. 1–2, 3, 4–5, and 6, pp. 77–86, 97–112, 234–240 and 266–282. Vienna, 1922.

These instalments deal with the subfamily OPHIONINAE, the last one including addenda to the subfamilies previously dealt with. [*Cf. R.A.E.*, A, ix, 36, 158.]

PRIESNER (H.). **Neue Rasenthripse aus Oesterreich.** [New Grass Thrips from Austria.]—*Konowia*, i, pt. 1–2, pp. 87–96, 5 figs. Vienna, 1922.

The thrips recorded include *Taeniothrips* (*sens. lat.*) *innocens*, sp. n., and *Trichothrips kloiberi*, sp. n.

PLIGINSKI (V.). **Луговой Мотылек** (*Phlyctaenodes* (*Eurycreon, Botys*) *sticticalis*, Linné.) **и борьба с ним.** [*Loxostege sticticalis* and its Control.]—**Курская Губ. Станция Защиты Растений от Вредителей С.-Х.** [*Kursk Govt. Sta. Protect. Plants from Pests Agric.*], 16 pp. Kursk, 1922. [Received 1st June 1923.]

The systematic position and distribution of *Loxostege* (*Phlyctaenodes*) *sticticalis*, L., is discussed, and the various stages are described. A general account is given of the bionomics and control of this moth which was particularly injurious to sugar-beet and hemp during 1921. According to the available literature two generations a year occur in European Russia, the second being incomplete owing to many of the larvae hibernating. Under exceptional seasonal conditions such as prevailed in Kharkov during 1921 a partial third generation may occur.

BARDIÉ (A.). **Remarques sur l'*Aleyrodes chelidonii*, Latr.**—*Procès-verb. Soc. Linn. Bordeaux*, lxxiv, no. 2, pp. 152–153. Bordeaux, 30th April 1923.

Aleurodes chelidonii is recorded in numbers on pumpkin, parsley and wild chicory. It is generally found on *Chelidonium* spp., but also occurs on cabbage, oak and numerous other plants. This Aleurodid can resist extreme cold and was observed to oviposit at the beginning of February on the leaves of chicory.

FEYTAUD (J.). **Redoutable invasion d'un Coléoptère américain dans le département de la Gironde.**—*Procès-verb. Soc. Linn. Bordeaux*, lxxiv, no. 2, pp. 98–100. Bordeaux, 30th April 1923.

Attention is called to the vital importance of propaganda in the campaign against *Leptinotarsa decemlineata*, Say (Colorado potato beetle) in the Gironde.

LESNE (P.). **Une station nouvelle du Termite lucifuge.**—*C.R. hebdom. Acad. Sci.*, clxxvi, no. 21, pp. 1507–1508. Paris, 1923.

Colonies of *Leucotermes lucifugus*, Rossi, were found in March, 1922, in the trunk of a dying *Strelitzia augusta* in a hot-house in Paris. The tree was at once dug up and burned and the soil fumigated with sulphur. In spite of these measures numbers of the insects were found in May, 1923, in the wood used as supports, etc. It is not known exactly when the pest was introduced.

LESNE (P.). **Quelques données sur l'invasion du** *Polygraphus pubescens* **dans le bassin parisien.**—*C.R. Acad. Agric. France*, ix, no. 17, pp. 480-481. Paris, 1923.

Polygraphus pubescens, F., which has recently been observed in the Paris region [*R.A.E.*, A, xi, 172] is reported as spreading in that locality, and is frequently found in company with another Scolytid, *Crypturgus cinereus*, Hrbst. These are evidently examples of recent invasions from Central Europe following the introduction of conifers into France.

DA COSTA LIMA (A.). **Catalogo systematico dos insectos que vivem nas plantas do Brasil e ensaio de bibliographia entomologica brasileira.** [A systematic List of the Insects living on Plants in Brazil and an Essay of Brazilian Entomological Bibliography.]—*Arch. Escola Sup. Agric. e Med. Vet.*, vi, no. 1-2, pp. 107–276. Nictheroy, December, 1922.

The title indicates the contents of this useful paper. The plants concerned are mentioned in each case, often with supplemental notes.

THYSS (—). **Anbau und Verwendung des Pyrèthre** (*Pyrethrum cinerariaefolium*). [The Cultivation and Use of Pyrethrum.]—*Luxemburger Weinztg.*, xi, no. 11, pp. 155–159. Grevenmacher, 2nd June 1923.

Experiments in the cultivation of pyrethrum in Alsace in 1922 have proved quite satisfactory, and the industry is being developed on a large scale.

FARSKÝ (O.). **K loňské invasi zavíječe.** [The preceding Year's Outbreak of *Loxostege sticticalis*, L.]—*Věstník českoslov. jednot řepařů*, Prague, 1922. (Abstract in *Neuheiten Gebiete Pflanzenschutzes*, 1922, no. 4, p. 5. Vienna, 1922. [Received 4th June 1923.]

When the larvae of the sugar-beet web-worm, *Loxostege* (*Phlyctaenodes*) *sticticalis*, L., appeared in 1921 in Czecho-Slovakia, they were preyed upon by huge swarms of starlings, assisted by other birds.

ZIMMERMANN (A.). **Die Cucurbitaceen, No. 2.**—186 pp., 99 figs. Jena, Gustav Fischer, 1922.

Two chapters in this work are devoted to the pests of Cucurbitaceae in East Africa. The more important of these include :—*Helopeltis bergrothi* on the stems and leaves of *Momordica* spp., etc. ; *Leptoglossus membranaceus*, F., on the fruit of *Peponium usambarense*, and

other plants; *Riptostus dentipes*, F., on the fruit of *Coccinia engleri*; the Coccinellids, *Epilachna* (*Solanophila*) *zimmermanni*, Horn, and *E.* (*S.*) *zetterstedti*, Muls., on the leaves of *Momordica* spp.; a Chrysomelid, *Aulacophora* (*Copa*) *orientalis*, Hornst, on the leaves of *Melothria argyrea* and allied plants; *Acidium ruficorne* destructive to the leaves, and *Diacantha diffusa*, Ws., and *Leptacantha festiva* to the leaves and flowers of most Cucurbitaceae.

TITSCHACK (E.). **Beiträge zu einer Monographie der Kleidermotte, *Tineola biselliella*.** [Contributions to a Monograph on the Clothes Moth, *T. biselliella*.]—*Ztschr. d. techn. Biol.*, x, pp. 1–168, 91 figs., 4 plates. 1922. (Abstract in *Centralbl. Bakt. Protozool. Paras. Infekt.*, IIte. Abt., lviii, no. 19–24, pp. 535–536. Jena, 25th May 1923.)

The morphology of *Tineola biselliella* is described. The proportion of males to females was found to be 65 to 35. The optimum temperature for oviposition is between 20° and 25° C. (68°–77° F.). Reduction in the quantity and quality of food reduces the number of eggs. The anatomy of the larvae is described. Only fasting individuals will eat such materials as cotton, nettles, etc. Up to 17 moults have been counted. The preparation known as "Eulan" [*R.A.E.*, A, ix, 611] is said to afford complete protection against this pest.

DEAN (G. A.). **Some Important Garden Insects.**—*Bienn. Rept. Kansas State Hortic. Soc., 1920–21*, xxxvi, pp. 154–170. Topeka, 1922. [Received 23rd May 1923.]

Brief notes are given on the bionomics and control of the more important garden pests in Kansas, such as *Murgantia histrionica*, Hahn (harlequin cabbage bug), *Pieris* (*Pontia*) *rapae*, L. (imported cabbage worm), *Diabrotica vittata*, F. (striped cucumber beetle), *Leptinotarsus decemlineata*, Say (Colorado potato beetle), *Loxostege similalis*, Guen. (garden webworm), *Thrips tabaci*, L. (onion thrips), *Melittia satyriniformis*, Hb. (squash-vine borer), *Anasa tristis*, DeG. (squash bug), *Papaipema nebris*, Gn. (common stalk borer), *Trichobaris trinotata*, Say (potato stalk weevil), *Nysius ericae*, Schill. (false chinch bug), etc.

DEAN (G. A.). **Some Insects injurious to Ornamentals.**—*Bienn. Rept. Kansas State Hortic. Soc., 1920–21*, xxxvi, pp. 170–178. Topeka, 1922. [Received 23rd May 1923.]

The bionomics and control of the following pests on ornamental shrubs are given: American rose slug [*Endelomyia rosae*], curled rose slug [*Emphytus cinctipes*], rose chafer [*Macrodactylus subspinosus*], San José scale [*Aspidiotus perniciosus*], rose scale [*Diaspis rosae*], cottony maple scale [*Pulvinaria innumerabilis*], *Empoa rosae* (rose-leaf hopper), etc.

HUNTER (S. J.). **An Ounce of Prevention.**—*Bienn. Rept. Kansas State Hortic. Soc., 1920–21*, xxxvi, pp. 178–182 and 184–194. Topeka, 1922. [Received 23rd May 1923.]

The subject of injurious insects is discussed from the standpoint of prevention rather than from that of treatment after they have begun their ravages. Those dealt with are *Cydia* (*Carpocapsa*) *pomonella*, L. (codling moth), *Palaeacrita vernata*, Peck. (spring cankerworm),

Malacosoma americanum F. (apple-tree tent caterpillar), *M. disstria*, Hb. (forest tent caterpillar), *Aegeria* (*Sanninoidea*) *exitiosa*, Say (peach tree borer), *Scolytus rugulosus*, Ratz. (fruit tree bark beetle), *Conotrachelus nenuphar*, Hrbst. (plum curculio), *Oecanthus nigricornis*, Wlk. (tree cricket), *Porthetria dispar*, L. (gipsy moth), brown tail moth [*Nygmia phaeorrhoea*, Don.], *Pyrausta nubilalis*, Hb. (European corn borer), and *Popillia japonica*, Newm. (green Japanese beetle).

A list is given of some quarantines, both domestic and foreign, that are in force.

KELLY (E. G.). **Notes of the Plum and Apple Curculio.**—*Bienn. Rept. Kansas State Hortic. Soc., 1920–21*, xxxvi, pp. 183–184. Topeka, 1922. [Received 23rd May 1923.]

Very early in the spring of 1920 *Conotrachelus nenuphar* and *Anthonomus quadrigibbus* appeared in great numbers. Spraying with lead arsenate at cluster-bud spraying time seemed to have no effect, because the weevils came from hibernation quite early and fed on the tender leaf buds before the blossom buds were sufficiently developed to spray. About six or eight days after the petals dropped, the orchards seemed to be alive with these two species feeding and ovipositing. A heavy fall of fruit was expected but there was a big crop of peaches and cherries, and in July the apples were still on the trees although every fruit seemed to be punctured. This limited injury was due to egg-parasites which materially reduced the hatching of the eggs. The new generation that began to mature in early July did more damage to apples and peaches than the overwintered beetles did when ovipositing. *A. quadrigibbus* did not go into hibernation when fully mature, but continued feeding until mid-August.

BRITTAIN (W. H.). **Report of the Professor of Entomology and Zoology and Provincial Entomologist.**—*Ann. Rept. Secy. Agric. Nova Scotia, 1922*, pp. 46–58. Halifax, N.S., 1923. [Received 4th June 1923.]

The general situation in Nova Scotia in regard to the brown tail moth [*Nygmia phaeorrhoea*, Don.] has changed but little in the last few years. There is no general or widespread infestation of it at the present time. The total number of localities infested in 1921–1922 is 15 as compared with 9 in 1920–21 and 22 in 1919–20. Four of the localities infested in 1920–21 were free from nests, and 10 new infestations were found. The food-plants recorded during the last few years are given. Owing to the number of nests collected during the winter of 1921–22, two cages were established to rear the Hymenopterous parasite, *Apanteles lacteicolor*, Vier., which was imported from the New England States.

WARD (J. M.). **Plum Culture: Diseases.**—*Tasmania Dept. Agric. Bull.* 106, pp. 14–15. [Hobart], 1922. [Received 5th June 1923.]

Eriocampoides limacina (*Selandria cerasi*) (pear or cherry slug) is the chief plum pest in Tasmania; against it the foliage should be sprayed with 4–5 lb. lead arsenate paste or 2 lb. powder to 100 gals. water during December or early January. *Aspidiotus perniciosus*

San José scale) is confined to the city gardens of Launceston; sprays of lime-sulphur at the 1–7 formula (32° Bé.) or of oil, 1 : 15, should be applied previous to the bursting of the buds. These measures are also recommended for *Lepidosaphes ulmi* (*Mytilaspis pomorum*) which occasionally attacks the trees. *Maroga* (*Cryptophaga*) *unipunctana* (cherry borer) sometimes attacks the wood. Small limbs should be cut off and burned, but in larger branches cotton wool dipped in carbon bisulphide should be inserted in the hole, which should then be blocked up with clay, etc.; a piece of wire pushed well into the hole often kills the larva. The eggs of this moth may be destroyed by spraying with winter strength lime-sulphur.

Nursery Stock, Plant and Seed Quarantine. Notice of Quarantine No. 37, with Regulations (2nd revision).—*U.S. Dept. Agric., Fed. Hortic. Bd.*, 15 pp. Washington, D.C., 5th April 1923.

Quarantine No. 37 [*R.A.E.*, A, vii, 184] is reprinted, and the supplemental Rules and Regulations are revised, minor alterations being made in the Regulations; the amendments of Regulations 7 and 3 [*R.A.E.*, A, xi, 268] are incorporated.

CHITTENDEN (F. H.). **The Striped Cucumber Beetle and how to control it.**—*U.S. Dept. Agric.*, Farmers' Bull. 1322, 16 pp., 16 figs. Washington, D.C., April 1923.

This is a revision of a previous bulletin on the bionomics and control of *Diabrotica vittata*, F., on Cucurbitaceae [*R.A.E.*, A, vii, 521]. In addition to the natural enemies already noticed are *Podisus maculiventris*, Say, *Stagmomantis carolina*, Johann, which is not an important factor, and the Nematode, *Howardula benigna*, Cobb.

Nicotine dust, a mixture of nicotine sulphate (liquid), hydrated lime and a carrier, preferably kaolin or china clay, is the most successful remedial measure that has so far been tested. A dust containing 1·6 per cent. nicotine or its equivalent (4 per cent. of nicotine sulphate containing 40 per cent. nicotine) is effective, and the formula recommended is 4 lb. nicotine sulphate containing 40 per cent. nicotine, with a carrier of 96 lb. calcium hydrate, or 72 lb. kaolin and 24 lb. lime. The nicotine sulphate should be sprinkled into the dust from a jar with a perforated metal cap and the mixture constantly stirred at the same time. The resulting dust, before use, should be resifted three or more times with the aid of a brush through a sieve having at least twenty meshes to the linear inch. The most effective machine for its application is of the knapsack bellows type, and it should be applied thick enough to form a good covering on the plants and the surface of the ground about their base. It may also be shaken from a cheese-cloth sack. About $\frac{1}{4}$–$\frac{1}{2}$ oz. to the hill is sufficient for one application, which should be made as soon as the plants appear above the ground. Later applications are necessary in case of unusual abundance of the beetles or of adverse atmospheric conditions such as wet weather. The plants and the soil at their bases must be kept well covered until all danger of the injury is passed; in the neighbourhood of the District of Columbia this period is about three weeks. If applied in time, nicotine dust affords practically complete protection to young cucurbits against *D. vittata*.

WHEELER (E. W.). **Some Braconids parasitic on Aphids and their Life-history (Hym.)**—*Ann. Ent. Soc. America*, xvi, no. 1, pp. 1–29, 1 table, 9 figs. Columbus, Ohio, March 1923.

Some account is given of various larval types of parasitic Hymenoptera and of the literature of the subject.

Most of the parasites of Aphids belong to the Braconid subfamily APHIDIINAE of which the following were studied for the purpose of this paper: *Aphidius ribis*, Hal., parasitic on *Macrosiphum* sp.; *Lysiphlebus testaceipes*, Cress., on *M. tanaceti*, L.; *A. phorodontis*, Ash., *Praon simulans*, Prov., and *Diaeretus rapae*, Curt., on *Myzus persicae*, Sulz; and *Ephedrus incompletus*, Prov., on *M. persicae* and *Aphis pseudobrassicae*, Davis. Oviposition usually occurs from 8 a.m., till 1 p.m. If the supply of Aphids is limited, the same female has been observed returning three or four times to oviposit in the same host, but it never feeds at the punctures. Three experiments with *Aphidius phorodontis* showed that one female parasitised in 4 days 21 Aphids out of 76; 3 females parasitised in 4 days 36 Aphids out of 70; and 4 females parasitised in 6 days 28 Aphids out of 29. The life-cycle of the parasite occupied about 19–23 days in April and May, the larval stages lasting about 10 days, and the pupal 4 or 5 days. Without food the life of the adult varies from 2–7 days, and with food 8 days or longer, but the limit has not been determined. In 11 out of 59 parasitised individuals more than one larva was present in a single host, but only one matured.

MATHESON (R.). **The wax secreting Glands of** *Pseudococcus citri*, **Risso.**—*Ann. Ent. Soc. America*, xvi, no. 1, pp. 50–56, 2 plates. Columbus, Ohio, March 1923.

The contents of this paper are indicated by its title.

STEAR (J. R.). *Orthocephalus mutabilis*, **Fall. (Hemip., Miridae.)**—*Bull. Brooklyn Ent. Soc.*, xviii, no. 2, p. 62. Brooklyn, N.Y., April 1923.

Orthocephalus mutabilis, Fall., was taken in 1922 on ox-eye daisy *Chrysanthemum leucanthemum*, which was noticeably injured by the feeding of this Capsid, the plants being undersized and poorly developed. This is a European species, and the only other record of it in America was in 1913 on wild daisy.

The Periodical Cicadas.—*Science*, lvii, no. 1482, Suppmt., pp. xii–xiv. Garrison, N.Y., 25th May 1923.

The seventeen-year locust [*Tibicen septemdecim*] is due to appear in 1923 in fifteen States east of the Mississippi. This pest has become less numerous in many localities owing to the cutting down of forests.

There is no practicable remedy against it on a large scale, but orchards and shrubs may be partly protected by thorough hand-picking, dusting with pyrethrum powder just when the insects are emerging, or spraying with kerosene emulsion about the same time.

BERNARD (C.). **Verslag van het Algemeen Proefstation voor Thee over het Jaar *1922*.** [Report of the General Tea Experiment Station for 1922.]—*Meded. Proefst. Thee*, no. 83, 27 pp. [Buitenzorg], 1923.

Some of the subjects mentioned have already been noticed [*R.A.E.*, A, x, 175, 176, 272; xi, 215]. The prolonged dry weather increased injury by the mites, *Brevipalpus obovatus*, *Tarsonemus translucens*, *Eriophyes* (*Phytoptus*) *theae* and *E.* (*P.*) *carinatus*. A serious attack by *Tetranychus bioculatus* was recorded, this being the first severe case observed in West Java. A Geometrid larva, *Boarmia* sp., did considerable damage, and as no parasites could be found, collection was the measure advocated. An investigation is being made on the borers attacking the timber used for tea chests.

ROUCHER (—). **Observations sur les semis et la culture du Pyrèthre de Dalmatie.**—*Rev. hortic. Algérie*, xxvii, no. 4, pp. 76–78. Algiers, April 1923.

An account is given of the method of sowing and cultivating *Pyrethrum* in Dalmatia.

DEFLOTH (P.). **Les Ennemis de la Vigne : Galles et Cryptogames.**—*La Vie agric. et rur.*, xxii, no. 22, pp. 367–370, 4 figs. Paris, 2nd June 1923.

This is a review of some of the more important pests of grape-vines in various parts of the world.

MERIDE (A.) & LE CERF (F.). **Un papillon prédateur des Caféiers à la Nouvelle-Calédonie.**—*Rev. Bot. app. & Agric. colon.*, iii, no. 21, pp. 343–344. Paris, 31st May 1923.

During the period of cyclones and drought that has persisted for the last ten years in New Caledonia, a new pest, in the form of a night-flying moth, has been attacking the coffee while in fruit. It is thought that this will prove to be a Noctuid of the genus *Ophideres*, but the insect has not yet been identified.

RAVAZ (L.). **Les insectes qui trouent les sarments.** [The Insects that mine in Vine-shoots.]—*Progrès agric. & vitic.*, lxxix, no. 23, pp. 534-536. Montpellier, 10th June 1923.

Sinoxylon sexdentatum is recorded as troublesome to vines in southern France. It constructs circular galleries, leaving only the bark intact, and then makes a longitudinal gallery.

[PASSALACQUA] (V.). **Un insetto che danneggia i frutti del pero.** [An Insect injuring Pears.]—*Il Rinnovamento econ-agrar.*, xvii, no. 4, pp. 57–58. Trapani, April 1923.

Pears at Trapani, Sicily, have been damaged by a sawfly, *Hoplocampa brevis*. The remedy advised is spraying with a sugary solution containing lead arsenate. This should be done at the end of March or early in April when the adult is about to oviposit on the young fruit. If this is not done, the infested fruit must be collected and burnt.

CIFERRI (R.). **Un pregiudizio che deve scomparire. L'innocuità dell'uso degli arseniati in agricoltura.** [A Prejudice that must disappear. The Harmlessness of the Use of Arsenicals in Agriculture.]—*Riv. Agric.*, xxviii, no. 22, pp. 344–346. Rome, 1st June 1923.

The published results obtained in various investigations on the supposed toxicity of fruits and vegetables that have been treated with arsenicals are reviewed.

ZILLIG (—). **Die Bekämpfung der Traubenwickler (Heu- und Sauerwurm).** [Measures against the Vine Moths of the First and Second Generations.]—*Nachrichtenbl. deutsch. Pflanzenschutzdienst*, iii, no. 5, pp. 33–34. Berlin, 1st May 1923.

Against both generations of the vine moths [*Clysia ambiguella*, Hb. and *Polychrosis botrana*, Schiff.], nicotine has been replaced in Germany on account of its high price, by Schweinfurt green (an arsenical free from lead and insoluble in water) or a modified form of it known as Urania green.

LÜSTNER (G.). **Stärkere Schäden an Mangold und Roten Rüben, verursacht durch die Raupe von** *Lita atriplicella*, **F.R.** [Somewhat severe Injuries to Mangold and Red Beet caused by the Larva of *Phthorimaea atriplicella*.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, iii, no. 5, p. 34. Berlin, 1st May 1923.

The larva of *Phthorimaea* (*Lita*) *atriplicella*, F.R., usually lives on *Atriplex* and *Chenopodium*, but has been recorded as defoliating beet and mangold. A severe infestation of these two crops occurred at Geisenheim in June 1922. The larva lives in the hearts of the plants and makes superficial mines on the stems of the young leaves, causing them to wither. The moths are on the wing in July and August.

Deutsches Reich. Verordnung über das Verbot der Einfuhr von Kartoffeln und anderen Pflanzen aus Frankreich. Vom 7. März 1923. [German Empire. Regulations on the Prohibition of the Importation of Potatoes and other Plants from France. Dated 7th March 1923.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, iii, no. 5, p. 37. Berlin, 1st May 1923.

The importation into Germany from France is forbidden of potatoes, tomato plants, egg plants and currant bushes, and of packing materials that have been used for them. This prohibition also applies to all other plants, etc., in which eggs, larvae or adults of the Colorado potato beetle [*Leptinotarsa decemlineata*] have been found.

SCHWARTZ (—). **Die Koloradokäfergefahr.** [The Colorado Beetle Peril.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, iii, no. 6, p. 43. Berlin, 1st June 1923.

Attention is drawn to the need for the utmost watchfulness in connection with the outbreak of the Colorado potato beetle [*Leptinotarsa decemlineata*] in France.

MORSTATT (H.). **Bibliographie der Pflanzenschutzliteratur. Das Jahr 1922.** [A Bibliography of Plant Protection Literature in 1922.]—*Biol. Reichsanst. Land- u. Forstwirtschaft.*, iv+163 pp. Berlin, P. Parey 1923.

The title of this publication indicates its contents. Previous years from 1914 have already been noticed [*R.A.E.*, A, ix, 445 ; x, 264, 540].

WÜLKER (G.). **Ueber Fortpflanzung und Entwicklung von** *Allantonema* **und verwandten Nematoden.** [On the Reproduction and Development of *Allantonema* and related Nematodes.]—*Zool. Anzeiger*, lvi, no. 7–8, pp. 160–164. Leipsic, 8th May 1923.

The larval stage and mating of *Allantonema mirabile* occur in the open, and the fertilised female enters the larvae of *Hylobius* from which the Nematode larvae are evacuated with the excreta. The same conditions apply probably to Nematodes of the genera *Bradynema*, *Tylenchus* and *Howardula*.

KARNY (H. H.). **Wissenschaftliche Ergebnisse der mit Unterstützung der Akademie der Wissenschaften in Wien aus der Erbschaft Treitl von F. Werner unternommenen zoologischen Expedition nach dem Anglo-Aegyptischen Sudan (Kordofan) 1914. X. Thysanoptera, Adenopoda, Thysanura.** [The Scientific Results of the Zoological Expedition to the Anglo-Egyptian Sudan (Kordofan) in 1914 undertaken by F. Werner through the Treitl Bequest and with the Support of the Academy of Sciences in Vienna.]—*Denkschr. Akad. Wiss. in Wien*, Mat.-Naturw. Klasse, xcviii, pp. 113–139, 1 plate. Vienna, 1922.

In all 16 species of Thysanoptera were collected, of which the majority are already known from Africa.

The following new species, already briefly described in "*Akad. Anz.* ii, Vienna 1920," are redescribed at length: *Thrips flavus*, Schr., var. *microchaetus* ; *Anaphothrips nubicus* from *Acacia* ; *Rhynchothrips aethiops* ; *Dolichothrips giraffa* from *Acacia* ; *Trichothrips ...ticeps* ; and *Gynaikothrips ebneri*.

BORGMEIER (T.). **A formiga argentina,** *Iridomyrmex humilis*, **Mayr.** [The Argentine Ant, *I. humilis*.]—*Chacaras e Quintaes*, xxvii, no. 5, pp. 409–410, 1 fig. S. Paulo, 15th May 1923.

This article gives notes on the spread of the Argentine ant, *Iridomyrmex humilis*, Mayr, to various countries, and endorses the view of von Thering that this pest originated in Brazil. The formula for a poison-bait specially recommended against it has already been noticed [*R.A.E.*, A, iv, 474].

LANGSTON (J. M.). **The Tobacco Leaf-folder of Porto Rico attacks Tomatoes in Mississippi.**—*Qtrly. Bull. State Pl. Bd. Mississippi*, ii, no. 4, pp. 7–9. A. & M. College, Miss., January 1923.

Pachyzancla periusalis, Wlk., the tobacco leaf-roller of Porto Rico, has recently been recorded for the first time in Mississippi. In Porto Rico it feeds on tobacco, eggplant, tomato and weeds of the nightshade family, including *Solanum nigrum*, which is common in Mississippi. Notes on this moth are given from articles that have been previously noticed [*R.A.E.*, A, iii, 477 ; vi, 485].

BYNUM (E. K.). **Notes on the Australian Tomato Weevil** (*Desiantha nociva*).—*Qtrly. Bull. State Pl. Bd. Mississippi*, ii, no. 4, pp. 12-16, 3 figs. A. & M. College, Miss., January 1923.

Listroderes (*Desiantha*) *nociva* (Australian tomato weevil) was first observed in the United States in March, 1922 [*R.A.E.*, A, xi, 109, 110]. Serious damage has been done to turnips, tomatos, potatoes and many other vegetable and garden crops, all parts of the plant above ground being attacked, though the chief injury is to the leaves, which are sometimes skeletonised. The details of the life-history are being worked out. Oviposition seems to begin in early autumn, full-grown larvae being found in the field on December 20th 1922. In breeding jars, eggs have been placed singly on the soil, the food, and the sides of the jar, and they are probably also deposited just below the surface of the soil. Both larvae and adults hide during the day and feed at night. Pupation occurs in a cell about 1 inch below the ground level. The adults seem to live for several months and are apparently repelled by lights. No information is available regarding remedial measures.

ARNOLD (G. F.). **Insects and Diseases intercepted during 1922.**—*Qtrly. Bull. State Pl. Bd. Mississippi*, ii, no. 4, pp. 34-39. A. & M. College, Miss., January 1923.

This list comprises, mainly, Coccids and Aphids intercepted on plants from neighbouring States.

SNAPP (O. I.). **Controlling the Curculio, Brown Rot, and Scab of Peaches in Mississippi.**—*Qtrly. Bull. State Pl. Bd. Mississippi*, iii, no. 1, pp. 1-13, 10 figs. A. & M. College, Miss., April 1923.

The remedial measures suggested for peach curculio [*Conotrachelus nenuphar*] in Mississippi are substantially the same as those recently recommended in North Carolina [*R.A.E.*, A, xi, 263]. In the Gulf States there are two generations annually, and it has been found that the majority of larvae of the first generation can be picked up in fallen fruit in three collections—the first soon after the calyx is shed and the others at intervals of five or six days. Disking for the pupae should be begun in Mississippi about 15th May, and repeated about once a week until the late varieties have been harvested. Directions for spraying and dusting are given.

BYNUM (E. K.). **Controlling the Australian Tomato Weevil,** *Desiantha nociva*.—*Qtrly. Bull. State Pl. Bd. Mississippi*, iii, no. 1, pp. 22-24. A. & M. College, Miss., April 1923.

Although information regarding the control of *Listroderes* (*Desiantha*) *nociva*, recently recorded from Mississippi [see above] is as yet limited, the indications are that spraying and dusting will both in all probability be effective, though no experiments in the latter method have been tried. A spray of 2 lb. lead arsenate to about 50 U.S. gals. water was effective against both the larvae and adults, provided the leaves were thoroughly covered.

BODKIN (G. E.). **[Report of the] Government Economic Biologist.**—*Rept. Dept. Sci. & Agric., Brit. Guiana, 1921*, Appx. iii, pp. 36-40. Georgetown, 1923.

Carbon bisulphide is the only satisfactory means of completely destroying *Atta fervens*, Say (coushi ant). A moderately severe outbreak

of the coconut caterpillar [*Brassolis sophorae*] occurred in some districts but was successfully controlled. A vegetable products factory was found to be infested with flour moth [*Ephestia kühniella*] and grain weevil [*Calandra granaria*], and fumigation with sulphur dioxide did not prove very successful owing to the impossibility of rendering the building air-tight to any practical extent.

Departmental Activities.—*Jl. Dept. Agric. Union S. Africa*, vi, no. 5, pp. 379–394, 4 figs. Pretoria, May 1923.

Cleanly ploughed strips of land around a cotton field form an effective barrier against Jassids which are becoming increasingly injurious to this crop, especially on the windward side.

Stacks of oats were found to be heavily infested with larvae of *Cirphis leucosticha*, the stalks being eaten away, though the grain appeared to be untouched.

Extensive injury to foliage of *Exocaria reticulata* has been caused by the larvae of *Achaea lienardi* in Zululand.

Raisins and other dried fruit are attacked by as many as fifteen different species of insects in the Cape Province, the most common and destructive of which is the Indian meal moth [*Plodia interpunctella*, Hb.]. A brief account is given of its life-history and control, the chief feature of the latter being cleanliness and fumigation with carbon bisulphide.

Fruit-fly Menace to America.—*Jl. Dept. Agric. Union S. Africa*, vi, no. 5, pp. 413–420. Pretoria, May 1923.

Excerpts are given from the Official Statement by the United States Department of Agriculture, issued with Notice of Hearing to consider advisability of excluding fruits and vegetables from countries where fruit-flies are pests.

In view of the supposed risk of admitting South African fruit into the United States Mr. C. P. Lounsbury pointed out that prohibitory restrictions on South African fresh fruit are both unnecessary and undesirable.

The Mediterranean fruit fly [*Ceratitis capitata*, Wied.], the chief pest concerned, is originally an imported insect and only of importance as a pest in mixed fruit gardens in Africa. In well kept orchards, devoted to one kind of fruit, it becomes a negligible factor. As most of the fruit is sent to America via England and is stored prior to embarkation, as well as during the voyage, in refrigerators, there can be no danger of any of the stages reaching their destination alive. Should by accident any fruit be insufficiently chilled to destroy the fruit-fly, there would be little or no chance of such fruit getting past England. The only other fruit-flies of interest in this connection are the melon flies [*Dacus*], but it is hardly conceivable that any fruit infested with these should be packed for export. Apart from the fact that general conditions are unfavourable for the establishment of *C. capitata* in America, most of the deciduous fruit exported from South Africa arrives in the cold season of the year.

Should South African fruit be forbidden entry, it is possible that the South African fruit-growers would on their side refuse admission to American apples and pears owing to the danger of introducing the apple fruit maggot [*Rhagoletis pomonella*, Walsh], the apple seed Chalcid [*Syntomaspis druparum*, Boh.] and other insects.

JONES (H. R. B.). **A Wound Parasite of Cotton Bolls.**—*Minist. Agric. Egypt, Tech. & Sci. Service*, Bull. 19 (Bot. Sec.), 8 pp., 2 plates. Cairo, 1923.

An account is given of the fungus, *Rhizopus nigricans* (black mould), which is the cause of much damage to cotton bolls. It does not affect healthy plants, but gains entrance through wounds, caused mainly by the pink bollworm, *Platyedra (Pectinophora) gossypiella* and the bollworm, *Earias insulana*. The only means of controlling the disease is by checking the attacks of the insects concerned. A thorough investigation into the effects of infection of the boll by *R. nigricans* on the life-history of the pink bollworm will probably be undertaken. It is thought that the presence of the fungus may make some difference to the long and short cycle of the caterpillar, and may possibly drive it out of the boll in which it is feeding or even kill it.

ROSS (W. A.) & ROBINSON (W.). **The Susceptibility of Grape Leaf Hopper Eggs to Nicotine.**—*Agric. Gaz. Canada*, x, no. 3, pp. 230–231. Ottawa, May–June 1923.

In consequence of heavy infestations of *Erythroneura comes* on vines in Ontario, experiments have been undertaken with both sprays and dusts. Previous recommendations have been to apply the spray after practically all the eggs have hatched, but this permits many of the nymphs to transform to the adult stage. The tests recorded show that nicotine sulphate 1 : 1200, with 5 lb. hydrated lime to 40 gallons will destroy the eggs in all stages of development, giving 100 per cent mortality. Spraying should therefore begin about the time the over-wintering adults cease oviposition, and not be continued after the most advanced nymphs have just changed to the fifth instar. When a week or more is required for spraying the vines, the process might begin when the earliest nymphs are in the fourth instar. Thorough spraying on these lines should practically eliminate the second generation.

TREHERNE (R. C.). **Root Maggots and their Control.**—*Canada Dept. Agric.*, Pamphlet no. 32, N.S., 8 pp., 5 figs. Ottawa, April 1923.

The present paper, which is a revision of an earlier one [*R.A.E.*, A, vi, 255], deals with the root maggots, *Phorbia (Hylemyia) brassicae*, Bch., *Hylemyia antiqua*, Meig., *H. cilicrura*, Rond., and *H. trichodactyla*, Rond.

Mercury bichloride is advocated against *P. brassicae* and would probably be efficient also against *H. trichodactyla.*

DUSTAN (A. G.). **The Natural Control of the White Marked Tussock Moth under City and Forest Conditions.**—*Proc. Acadian Ent. Soc., 1922*, no. 8, pp. 109–126, 2 plates. Fredericton, N.B., April 1923. [Received 15th June 1923.]

Hemerocampa leucostigma, S. and A. (white marked tussock moth) is a serious pest in the towns of New Brunswick and Nova Scotia where it causes a great deal of damage to shade trees. Owing to natural enemies the serious outbreaks of this pest are of short duration and are usually from 7–10 years apart in any one place.

Though of economic importance in the three Maritime Provinces of Canada as well as in Quebec and Ontario, it is not found in the

prairies or in British Columbia. In the United States it occurs from Maine to the Gulf of Mexico and as far west as the Mississippi valley ; it has also been recorded from Nebraska, Iowa and Oregon.

On the average the total life-cycle from the time the eggs hatch until the eggs of the next generation are laid occupies 69 days. There is only one generation a year. Hibernation occurs in the egg stage, this sometimes lasting as much as 42 weeks. The egg-masses may be found almost anywhere, including all parts of the trunk and limbs of trees, buildings, fences and telephone poles. The larvae are solitary feeders and may wander long distances in search of a suitable place for pupation.

A comparison of forest and town conditions shows that in the former the pest is kept under control by predators, the more important of which are birds and ants ; in the towns, though the larvae and pupae may be attacked by parasites and disease, the main factors are the starvation of larvae emerging from eggs laid on buildings, fences, etc. and the failure of eggs to hatch as a result of unsuitable weather and other conditions.

Jeffrey (A. G.). **A histological Account of three Parasites of the Fall Webworm** (*Hyphantria cunea*, **Drury**).—*Proc. Acadian Ent. Soc., 1922*, no. 8, pp. 73–94, 3 plates. Fredericton, N.B., April 1923. [Received 15th June 1923.]

The three species dealt with are *Hemiteles tenellus*, Say, a secondary parasite attacking *Campoplex pilosulus* an important primary parasite of *Hyphantria cunea*, Drury ; a Chalcid, *Habrocytus* sp., reared from cocoons of *Rhogas* sp. ; and *Rhogas hyphantriae*, Gahan, a primary parasite of *H. cunea*. *Hemiteles tenellus* is in its turn parasitised by a Chalcid so that it does not materially reduce the numbers of *C. pilosulus*.

Froggatt (W. W.). **Insect Pests of the Cultivated Cotton Plant. No. 4. Cutworms and Leaf-eating Beetles.**—*Agric. Gaz. N.S.W.*, xxxiv, pt. 5, pp. 343–348. Sydney, 1st May 1923.

A brief account is given of the cosmopolitan insects that attack many different plants, including cotton. *Heliothis obsoleta* (cotton bollworm) is one of the commonest and most widely distributed Noctuids in Australia and is recorded as a field crop pest all over the world. *Agrotis ypsilon* damages many different field crops in Australia in the larval stage.

Dichocrocis (*Conogethes*) *punctiferalis* has been reported on cotton bolls ; it is a well known moth in seed heads of *Sorghum*, and it also gnaws into the stems and cobs of maize. *Prodenia litura* (*littoralis*) lays eggs in masses on the lower surface of cotton foliage. *Cirphis unipuncta* (army worm) was accidentally introduced into Australia at an early date. The eggs are laid on grass and herbage along the river flats. Pupation occurs in the soil. A poison bait should be scattered over the feeding grounds as soon as the caterpillars appear.

Against *Monolepta rosea*, spraying with a surface poison will kill the beetles, unless they are so numerous that the foliage is destroyed first. Dust sprays may have a repellent effect. The use of a torch flare has already been noticed [*R.A.E.*, A, xi, 339]. An acetylene lamp or other naked light is equally effective, or a "hopper dozer" or oil pan may be used.

Epilachna vigintioctopunctata during recent years has been found feeding on cucumber, melon and pumpkin foliage, and has now been found attacking cotton in one district. Both the larvae and adults feed on the upper surface of the leaves.

GOODACRE (W. A.). **A Casual Enemy of the Bee. The Dragon Fly** (*Hemianax papuensis*).—*Agric. Gaz. N.S.W.*, xxxiv, pt. 5, pp. 373–374, 1 fig. Sydney, 1st May 1923.

During 1921–22 *Hemianax papuensis* became a serious pest to apiaries. Under ordinary conditions of life this dragonfly lives on small flies and gnats, but when its natural food is scarce, it may frequent beehives and capture many bees.

ALLEN (W. J.) & BRERETON (W. Le G.). **Some Suggestions on Spray Management.**—*Agric. Gaz. N.S.W.*, xxxiv, pts. 2–5, pp. 129–134, 201–208, 281–285, 349–353, 12 figs. Sydney, 1st February–1st May 1923.

With a view to helping orchardists to mix and apply sprays with the greatest possible expedition and economy, these suggestions have been collected from various sources, and information on methods of transport, efficient appliances, facilities for mixing, and the care of spray apparatus is given.

ALLEN (W. J.) & BRERETON (W. Le G.). **Further Experiments with a Spray Gun.**—*Agric. Gaz. N.S.W.*, xxxiv, pt. 5, pp. 354–356. Sydney, 1st May 1923.

In the first tests with a spray gun in 1919 [*R.A.E.*, A, viii, 132] it failed to give a long distance spray. Further tests with another pattern show more promising results. The spray used was lead arsenate, and it is doubtful whether lime-sulphur could be applied in windy weather. The fine jet showed an advantage over double nozzles both in time and the amount of spray used when tested on tall trees requiring a rod 10 ft. 4 in. long. On lower trees requiring 8-ft. rods double nozzles showed a lower consumption of spray per tree, but the gun showed a saving in time. It is considered that the gun is a valuable addition to spray appliances especially for tall trees, and that one man can work a gun faster than he can use the nozzles single-handed.

JARVIS (H.). **Fruit Fly Investigation.**—*Queensland Agric. Jl.*, xviii, pt. 6, pp. 387–389. Brisbane, December 1922. [Received 16th June 1923.]

No living pupae of *Dacus ferrugineus* (*Chaetodacus tryoni*) were found in soil below various fruit trees in October. No larvae were found in citrus fruit, but in almost every case they were found in different stages of growth in loquats. This is a much grown fruit, and as it ripens just prior to the maturing of citrus fruits, it constitutes a serious source of fruit-fly infestation. The same results were found in another district where the loquat is less common.

The black peach Aphis [*Aphis persicae-niger*] is still doing considerable damage in certain districts, and in October it was abundant on the fibrous roots of peach trees. No winged forms were observed.

but adult viviparous wingless females and immature forms were abundant, all underground at a depth of about 12 in. If this Aphid winters on the roots of peach and plum trees, remedial measures with an injector in late winter may prove effective.

JARVIS (E.). **Cane Pest Combat and Control.**—*Queensland Agric. Jl.*, xviii, pt. 6, pp. 392–394. Brisbane, December 1922. [Received 16th June 1923.]

Serious infestation by *Phragmatiphila truncata*, Wlk., was noticed during August to October among mature crops of sugar-cane, the larvae being found mostly near the top of the canes. This moth appears to be abundant because climatic conditions have been unfavourable to its natural enemies, the chief of which is the Braconid, *Apanteles nonagriae*, Olliff.

Carbon bisulphide, in varying amounts of 2–8 drachms, was injected at a depth of 9 in. immediately under the lines of stools where grey-back beetles [*Lepidoderma hirta*] had emerged from the pupae and were ready to leave the soil; 24 hours later the only living individuals were located at distances exceeding 9 in. from the actual place of injection.

JARVIS (E.). **Cane Pest Combat and Control.**—*Queensland Agric. Jl.*, xix, pt. 4, pp. 282–283. Brisbane, April 1923.

Cane grubs show a decided liking for leaves of the weed, *Tagetes glandulifera*, which may prove useful as a trap crop. In attempts in 1922 to test the effect of poisonous plants on the larvae, those of the genus *Crotalaria* gave the most promising results.

TRYON (H.). **The Common Fruit Fly** (*Chaetodacus tryoni*). **Some Elementary Facts.**—*Queensland Agric. Jl.*, xix, pt. 4, p. 284. Brisbane, April 1923.

The bionomics of *Dacus ferrugineus* (*Chaetodacus tryoni*) are briefly noted.

JARVIS (E.). **On the Habits and Colouration of Queensland Rutelidae.**—*Queensland Agric. Jl.*, xix, pt. 4, pp. 333–335, 1 col. plate. Brisbane, April 1923.

Anoplognathus aureus, Waterh. (*frenchi*, Blackb.), feeds on the foliage of a wild *Hibiscus*; the larvae subsist on the roots of various native plants, and may later on be found to attack cane. *Anomala antiqua*, Gyll. (*australasiae*, Blackb.), was first recorded as a sugar-cane pest in 1916 [*R.A.E.*, A, iv, 345]. A brief description is given of the immature stages. One female was found to have laid 18 eggs 9 days after capture; these hatched in 19 days, and 2 months later several third-stage grubs were found. Other females captured on the 5th December produced eggs 6 days later, and these hatched in 15 days. By the middle of April nearly all the grubs bred during the course of the investigations had moulted into the third stage, and early in May were beginning to pupate.

Repsimus aeneus, F., is common about Sydney when it is found clinging to low bushes. In 1915 one was found killed by the Pentatomid, *Amyotea hamata*, Wlk. Of other allied beetles only *Anoplognathus boisduvali*, Boisd., has been recorded as a pest of sugar-cane; its habits have already been noticed [*R.A.E.*, A, iii, 491].

Borden (A. D.). **Control of the Common Mealybug on Citrus in California.**—*U.S. Dept. Agric.*, Farmers' Bull. 1309, 10 pp., 5 figs. Washington, D.C., February 1923.

This paper on the control of *Pseudococcus citri*, Risso, in California is a revision of one previously noticed, together with some additional information on the relation of the Argentine ant [*Iridomyrmex humilis*, Mayr] to this Coccid [*R.A.E.*, A, vi, 215; viii, 115].

Phillips (W. J.) & King (K. M.). **The Corn Ear-worm: its Ravages on Field Corn and Suggestions for Control.**—*U.S. Dept. Agric.*, Farmers' Bull. 1310, 17 pp., 18 figs. Washington, D.C., January 1923.

An account is given of the life-history and habits of *Heliothis obsoleta*, F., as a pest of maize with particular reference to Virginia conditions.

Of the 19 natural enemies given, 3 have been reared from larvae in Virginia and are recorded for the first time from this host; they are *Paniscus* sp., near *geminatus*, Say, *Sagaritis dubitatus*, Cress., and *Sarcophaga latisterna*, Park. The others are *Trichogramma minutum*, Riley, *Triphleps insidiosus*, Say, *Ceratomegilla fuscilabris*, Muls., *Hippodamia convergens*, Guer., *Nabis ferus*, L., *Chrysopa* spp., *Chauliognathus marginatus*, F., *C. pennsylvanicus*, DeG. and *Winthemia quadripustulata*, F.

Infestation may be greatly reduced by changes in cultural practices including judicious choice of time of sowing; on small areas it is advisable to dust the silks with lead arsenate and finely ground sulphur in equal parts.

Thorne (G.). **Length of the Dormancy Period of the Sugar-beet Nematode in Utah.**—*U.S. Dept. Agric.*, Dept. Circ. 262, 5 pp. Washington, D.C., February 1923.

The eggs of the sugar-beet Nematode, *Heterodera schachtii*, Schmidt, are contained in a brown cyst which is the dead body of the female. The larvae lie dormant within the eggs, some hatching each year and emerging from the cyst. This dormant form enables the pest to remain in the soil for several years, even when deprived of its food-plants. A survey of the infested beet-growing sections of Utah show that there is a decrease in the number of eggs remaining in the cysts corresponding to the number of years that the land has not been planted with sugar beets. This decrease is almost regular until the end of the sixth year, when most of the Nematodes have hatched, this apparently marking the limit of the dormancy period. The possibility of the Nematodes surviving on the various rotation crops grown, which included lucerne, wheat, oats, barley, maize, potatoes and tomatoes, was studied, but there was never any sign of the pest at the roots, though most of these have been recorded as food-plants in Europe. The Nematodes were, however, found living in considerable numbers on the roots of mustards, pigweed (*Chenopodium album*), knotweed (*Polygonum minimum*), saltweed (*Atriplex* spp.), and rarely on purslane (*Portulaca oleracea*). There is a possibility that certain types of Nematode have developed that can live on these weeds; considerable numbers were found in two fields for three years in succession on *C. album*. Soil samples from areas where no weeds had grown for some time rarely showed cysts containing eggs after the sixth year, while those taken in open places where weeds may have been present contained cysts that were full or partly full of eggs.

It is, therefore, evident that there is little or no possibility of eradicating *H. schachtii* from the soil by any method of crop rotation applicable to general farm practice. The Nematodes have been found living in Utah on cabbage, cauliflower, turnips and beets of other varieties. There is apparently no difference in the number of eggs that hatch in relation to the crop planted.

COAD (B. R.) & CASSIDY (T. P.). **Dusting for the Cotton Boll Weevil.** —*U.S. Dept. Agric.*, Dept. Circ. 274, 3 pp. Washington D.C., May 1923.

This circular has been prepared to give in a brief and concise form the information needed by cotton growers to enable them to decide whether it will pay them to poison for *Anthonomus grandis* and what methods they should follow.

BRITTON (W. E.) & CLINTON (G. P.). **Spray Calendar.**—*Connecticut Agric. Expt. Sta.*, Bull. 244, pp. 183–226, figs. New Haven, Conn., January 1923.

This spray calendar for 1923 is modelled upon earlier ones [*R.A.E.*, A, ix, 241].

ZAPPE (M. P.) & STODDARD (E. M.). **Results of Dusting versus Spraying in Connecticut Apple and Peach Orchards in 1922.**—*Connecticut Agric. Expt. Sta.*, Bull. 245, pp. 229–243. New Haven, Conn., February 1923.

A series of experiments is recorded for purpose of comparison of liquid and dust sprays for the control of common insect and fungus pests of apple orchards in Connecticut. The results show that where fungous diseases are not likely to be present a fair grade of commercial fruit may be obtained by the use of dusts, but where the highest grade of apples is required, a liquid spray, consisting of 3 U.S. gals. commercial lime-sulphur, 3 lb. dry lead arsenate and $\frac{3}{4}$ pint nicotine sulphate to 100 U.S. gals. water, may be relied upon to give the best results. The relative value of various dust mixtures is discussed. The best of these for controlling Aphids and red bugs, curculio [*Conotrachelus nenuphar*], codling moth [*Cydia pomonella*] and other chewing insects consists of 65 per cent. superfine dusting sulphur, 10 per cent. lead arsenate, 5 per cent. nicotine sulphate and 20 per cent. carrier.

PORTER (B. A.) & GARMAN (P.). **The Apple and Thorn Skeletonizer.**—*Connecticut Agric. Expt. Sta.*, Bull. 246, pp. 247–264, 4 plates, 3 figs. New Haven, Conn., February 1923.

Hemerophila pariana, Clerck, causes considerable damage to orchard trees in Connecticut, the trees being in many cases completely defoliated by September. Most of the injury occurs in small private orchards, the routine spray applications in commercial orchards generally keeping the pest in check. The third generation will probably be the most troublesome in commercial orchards and may be controlled by an additional application of lead arsenate at the rate of 1 lb. of the dry form to 50 U.S. gals. of water when the larvae are becoming numerous in the latter part of August.

The chief food-plant in the United States is the apple; to a less extent thorn and pear are attacked, and in one case sweet cherry has been recorded as a food-plant. The various stages are described. Though there is no definite proof, hibernation is thought to occur in the adult stage. Egg laying begins as soon as the leaves appear, the eggs being generally placed on the lower surface of the leaf. Larvae in various stages were found during May, cocoons being spun as early as 28th May. Larvae of the second generation were found in the latter part of June, some of them reaching maturity in the middle of July. The third generation adults emerge from September to November, and under exceptional weather conditions, some of these laid eggs in October both in the cages and in the field.

The eggs hatch in about a week. The larvae feed for three weeks or more after which the cocoon is usually made in an angle or fold of the leaf or cracks of buildings, etc. In the case of the first two generations the moths emerge in less than 12 days from the spinning of the cocoon, but in the cooler weather in November more than 6 weeks may be spent in the pupal stage.

Numerous parasites have been reared in Connecticut, most of which attack the larvae. They are: *Habrobracon gelechiae*, Ashm., *Diocles obliteratus*, Cress., *Sagaritis* sp., *Exochus propinquus*, Cress., *Epiurus indagator*, Cress., *Exorista pyste*, Wlk., and *Phorocera tortricis*, Coq. Those attacking the pupa are *Dibrachys boucheanus*, Ratz., and *Nemorilla maculosa*, Meig. Parasites recorded from Europe are: *Angilia glabricola*, Holmgr., *Mesochorus pectoralis*, Rag., *Microgaster* sp., *Phygadeuon* sp., and *Thryptocera crassicornis*, Meig.

BRITTON (W. E.). **Control of Ant Invasions.**—*Connecticut Agric. Expt. Sta.*, Bull. Immediate Inf., no. 17, 6 pp., 1 fig. New Haven, Conn., July 1922. [Received 13th June 1923.]

The commoner species of ants and the nature of their attack on gardens and buildings are discussed. The best method of killing them in their nests is by fumigation with carbon bisulphide, and in houses by scattering naphthaline flakes on shelves and floors, particularly along the runways, or by trapping them in sponges moistened with sweetened water. If these remedies are not successful, a poison bait should be made by dissolving 1 lb. sugar in a quart of water, then adding 125 grains of sodium arsenate until both are well dissolved and then a tablespoonful of honey. This should be placed with bits of sponge in small shallow dishes, using two or three in each room. On trees and plants, Aphids and other insects that attract ants should be destroyed.

WEISS (H. B.) & LOTT (R. B.). **Notes on the Desmodium Sawfly, *Atomacera desmodii*, Dyar (Hymen.: Tenthredinidae).**—*Ent. News.*, xxxiv, no. 6, p. 167. Philadelphia, Pa., June 1923.

The adults of *Atomacera desmodii*, Dyar, appear from about the middle of May to the first week in June in New Jersey, the eggs being laid on the leaves of *Meibomia* (*Desmodium*) *canadensis*. The larvae feed on the lower surface of the leaf. Hibernation occurs in a cocoon at the base of the plant either in the larval or pupal stage. There are two broods a year, about two months being required for a complete life-cycle. The second generation of adults appears from the end of July to the beginning of August, and as oviposition occurs over several weeks, there is considerable overlapping of the broods.

FLETCHER (T. B.) & INGLIS (C. M.). **Some Common Indian Birds. No. 21. The Common Mynah** (*Acridotheres tristis*).—*Agric. Jl. India*, xviii, pt. 3, pp. 199–203, 1 col. plate. Calcutta, May 1923.

Acridotheres tristis must be considered to be a useful bird in India. Its food consists mainly of grasshoppers and many other insects, and although fruit and cereals particularly maize are sometimes injured, the damage caused to these crops is outweighed by the destruction of insect pests throughout the year.

This bird is protected throughout the year in Bombay, the United Provinces, Delhi and Bengal, and in Burma in reserved forest areas.

BRITTAIN (W. H.). **The European Apple Sucker** (*Psyllia mali*, **Schmidberger**).—*Nova Scotia Dept. Agric.*, Bull. 10, 69 pp., 6 plates. Truro, N.S., March 1923.

A general account is given of *Psylla* (*Psyllia*) *mali*, Schmidb. (apple sucker) as occurring in Nova Scotia, and of the experiments in remedial measures that were carried on during 1920–22 [*R.A.E.*, A, x, 199, 307, 612; xi, 118]. Dusting is recommended only when conditions are ideal. In mixed plantings where varieties do not bloom together and cannot be treated separately, it is almost useless. Dusting when the earlier varieties are in full bloom, with the arsenical omitted, would probably be the best for mixed plantings. Sulphur-nicotine dusts are fairly effective, but are heavy and difficult to apply with most machines. Copper-lime-nicotine dusts are less effective, a larger proportion of the nicotine in them remaining inactive. Dusts containing a large proportion of lime are light and easy to apply, and the nicotine in them is more active. Treatment for the adults only in early summer is useless owing to reinfestation, but might be more effective late in August just before oviposition begins.

Processionary Caterpillar.—*Cyprus Agric. Jl.*, xviii, pt. 2, pp. 47–48. Nicosia, April 1923.

The processionary caterpillar [*Cnethocampa processionea*, L.] chiefly attacks the shoots of the common pine [*Pinus halepensis*] in Cyprus. The injury disfigures the tree and in time becomes the indirect cause of its death. Attention is called to the necessity of collecting and destroying the caterpillars.

BRAIN (C. K.). **A Preliminary Report on the Intracellular Symbionts of South African Coccidae.**—*Ann. Univ. Stellenbosch*, i, Section A, no. 2, 48 pp., 12 plates. Cape Town, April 1923. Price 2*s*. 6*d*.

The general considerations of this subject are briefly outlined, and the literature dealing with the symbionts of insects is reviewed. A bibliography is appended.

An attempt is made to define the genera already established, with a short record of every known species. Seven new genera are erected, and eleven new species are described.

PARROTT (P. J.), STEWART (F. C.) & GLASGOW (H.). **1922 Experiments on Control of Borers and Leaf Curl of Peaches.**—*New York Agric. Expt. Sta.*, Circ. 64, 7 pp., 6 tables. Geneva, N.Y., 1st December 1922. [Received 19th June 1923.]

Experiments to determine the effectiveness of paradichlorobenzene against peach tree borers [*Aegeria exitiosa*] are described. In

trees treated with ½–¾ oz. in August 26 living borers were found, and in September none, against 34 in the control trees. An application of 1 oz. in July and August showed no borers in the trees examined against 146 in control trees.

MACLEOD (G. F.) & HARMAN (S. W.). **The Aphiscidal Properties of Tobacco Dust.**—*New York Agric. Expt. Sta.*, Bull. 502, 18 pp., 3 plates, 9 tables. Geneva, N.Y., April 1923.

A series of tests was made to determine the range of usefulness of tobacco dust as an insecticide and its harmlessness to plant growth with special reference to its toxicity to *Myzus persicae*, Sulz. (greenhouse aphis), a pest particularly abundant on blue spirea, *Caryopteris mastacanthus*, in greenhouses in New York. The nature of this Aphid and the materials and methods of procedure are described.

The tobacco dusts used contained approximately 1 per cent. nicotine. Tests with reground tobacco dust showed that the finer grades possessed greater killing powers, a 50-mesh mixture showing an average percentage of 12·4 killed, against 91·4 with a 200-mesh mixture. Commercial tobacco dust with a 200-mesh mixture showed an average of 61·0 killed, and a 50-mesh mixture 18·3. In a second sample a higher rate of killing occurred, and the absence of an adulterant in any appreciable amount was an important factor in the increased efficiency of the material. The best result (an average percentage killed of 96·8) was obtained with a 200-mesh mixture, containing 1·41 per cent. nicotine. It was, however, found that the plants were reinfested six days after the application.

Calcium hydrate in combination with nicotine dust assists in the liberation of nicotine, but the addition of it, on the whole, results in decreasing the insecticidal efficiency, and this loss in toxicity increases proportionately with the amount of lime that is added. A tobacco dust diluted with 10 per cent. calcium hydrate was not as effective as pure tobacco dust but was of more value than a mixture containing 25 per cent. calcium hydrate. At a dilution of 1 part calcium hydrate to 3 of tobacco dust, mixtures containing less than 2 per cent. nicotine exhibited comparatively low insecticidal value, while those of greater nicotine content showed marked killing power. Tobacco dust on the whole did not exhibit as high a percentage of killing as did nicotine sulphate and free nicotine dusts. Dusts in which kaolin was used as a carrier of the nicotine failed to kill 80 per cent. of the Aphids. It is to be noted that *M. persicae* may be considered an insect relatively susceptible to nicotine preparations and, under circumstances involving more resistant species, the differences might presumably be more pronounced in favour of nicotine sulphate and free nicotine materials.

In experiments to ascertain whether it was necessary to bring the Aphids into contact with the mixture in order to destroy them or whether the toxicity of the materials was due to the fumes given off, it was found that 95·7 per cent. were killed when brought into contact with 200-mesh tobacco dust, 92·9 per cent. with 200-mesh tobacco with 25 per cent. hydrated lime, and 97·8 per cent. with hydrated lime and 1 per cent. nicotine. In each case complete control was obtained with those insects not brought into contact with the insecticide.

Unfortunately very few data are available relative to the use, efficiency and economy of tobacco dust for the protection of orchard and field crops, and further research is needed before the utility of the

product in comparison with dusting mixtures containing nicotine sulphate and free nicotine can be definitely stated. Tobacco dusts undoubtedly have a field of usefulness that warrants further investigation.

SMITH (R. C.). **The Biology of the Chrysopidae.**—*Cornell Univ. Agric. Expt. Sta.*, Mem. 58, pp. 1291–1372, 14 plates, 10 figs. Ithaca, N.Y., June 1922. [Received 20th June 1923.]

The biology of all stages of Chrysopids is fully given, and a key to third-instar larvae is included. Factors affecting the spread of these lacewings and their economic importance are noted. Descriptions of the early stages of eleven different species are recorded, and an extensive bibliography is appended.

NEWELL (W.). **The Quarantine Situation—What is Needed.**—*Qtrly. Bull. State Pl. Bd. Florida*, vii, no. 3, pp. 149–159, 2 tables, 1 fig. Gainesville, Fla., April 1923.

The situation in regard to the Japanese beetle [*Popillia japonica*] is quoted as an argument in favour of the need for more stringent quarantine measures. It is urged that the Department of Agriculture should create efficient quarantines to prevent the introduction of foreign pests, and that it should adopt a more vigorous policy in eradicating or repressing such foreign pests as may become established. Direct measures should be taken immediately to repress *P. japonica* in the affected territory.

HUNT (C. M.). **An Unusual Outbreak of the Orange Basket Worm** (*Platoeceticus gloverii*, **Pack.**).—*Qtrly. Bull. State Pl. Bd. Florida*, vii, no. 3, pp. 159–165, 5 figs. Gainesville, Fla., April 1923.

A brief description is given of *Platoeceticus gloveri*, Pack., which was recorded as seriously infesting citrus in two instances in 1922–23 in Florida. The larvae of this Psychid moth were first observed in the groves about October feeding on pineapple oranges; they became more numerous in November and December, but very little increase was noticed in January and February. Towards the end of February they increased rapidly and were at their worst early in March. The majority of the larvae was found on the fruit, and they were also observed on young growth and twigs, but older leaves were not much damaged. On the fruit they eat through the outer skin to the oil cells and leave scarred patches, and sometimes they eat through to the pulp of the orange but have not been observed feeding on it. On grapefruit they eat deeper into the rind. When in considerable numbers, they may be controlled by spraying with a stomach poison, such as lead arsenate. Basic lead arsenate may be added safely to an oil emulsion spray, but acid lead arsenate must be applied separately.

CHAFFIN (J.). **A Serious Pest of the Grape is now Present in Florida.**—*Qtrly. Bull. State Pl. Bd. Florida*, vii, no. 3, pp. 165–166, 1 fig. Gainesville, Fla., April 1923.

Pseudococcus maritimus, Ehrh. (grape vine mealy bug) has recently been collected on cedar, and this is the first record of it on the mainland of Florida, though it has previously been collected elsewhere in Florida from avocado, sweet potato and tomato. It is reported to thrive on almost any wild or cultivated plant so that it may become a serious

menace to the grape and other horticultural industries, as the climatic conditions in Florida are favourable to its development. The first brood appears at the end of March or beginning of April, though in California it does not appear till June. So far no reliable or satisfactory remedial measures have been found.

MERRILL (G. B.). **A new Scale Insect from Florida (Order: Hemiptera. Family: Coccidae).**—*Qtrly Bull. State Pl. Bd. Florida*, vii, no. 3, pp. 167–168, 2 figs. Gainesville, Fla., April 1923.

Targionia quohogiformis, sp. n., from a plant, probably *Bignonia speciosa*, is described. Other plants found infested in Florida are Australia silk oak [*Grevillea robusta*], mountain ebony, *Petraea volubilis* and wild mulberry. In the British West Indies it infests croton, and at Santiago, custard apple.

CHAFFIN (J.). **Two new Species of Mealy-bugs from Florida (Order: Hemiptera. Family: Coccidae).**—*Qtrly. Bull. State Pl. Bd. Florida*, vii, no. 3, pp. 169–171, 4 figs. Gainesville, Fla., April 1923

The new species described are *Eriococcus parvispinus*, from milk pea (*Galactia volubilis*), and *Lachnodiella acritocera* from lancewood (*Ocotea catesbyana*).

FAES (H.) & STAEHELIN (M.). **L'utilisation des gaz toxiques dans la lutte contre les insectes nuisibles.**—*Ann. agric. Suisse*, xxiv, no. 1, pp. 9–18. Berne, 1923.

The use that has been made of toxic gases against insect pests is reviewed, and a number of experiments with them that have been conducted in the Swiss federal experiment station are recorded. Their action was found to be very variable according to the different types of insect on which they were used. Rhynchota, Diptera and Lepidoptera are as a rule easily killed, but Coleoptera show a considerable resistance. The experiments indicate that the period of exposure to toxic vapours is of the greatest importance, greater even than the concentration used. If the exposure is short, the insect becomes lethargic but recovers some time after the exposure is over. If the period is long, the insect is eventually obliged to open the stomata and absorb the vapour. The ideal gas would be one that would be effective with a moderate exposure, not only on insects but also on fungi and bacteria. Carbon bisulphide, hydrocyanic acid gas and chloropicrin are all valuable as insecticides. Hydrocyanic acid gas has the most rapid action, but the effect is not lasting. The other two act more slowly, but the effect they produce is more durable, chloropicrin being the stronger insecticide. Sodium cyanide injected into the soil at different concentrations for the destruction of *Phylloxera* has not given good results.

FAES (H.) & STAEHELIN (M.). **La résistance du ver blanc ou larve du hanneton (*Melolontha vulgaris*) aux basses températures.**—*Ann. agric. Suisse*, xxiv, no. 1, pp. 29–31. Berne, 1923.

Further tests regarding the temperatures that are fatal to *Melolontha melolontha* (*vulgaris*) [*R.A.E.*, A, ix, 419, 545] have shown that the larvae can survive in the soil at −6° C. (21·2° F.) and that the adults can withstand −8° C. (17·6° F.), so that neither stage can be exterminated by any degree of cold that is likely to occur in Lausanne.

PRIESNER (H.). **Beiträge zur Lebengeschichte der Thysanopteren.** Contribution to the Life-history of Thysanoptera.]—*Sitz. Akad. Wiss. Wien.*, Abt. I, cxxxi, no. 4–5, pp. 67–75, 7 figs. Vienna, 1922. [Received 16th June 1923.]

Numbers of *Rhopalandrothrips obscurus*, Uz., are reported from *Corylus*, *Alnus*, *Betula* and *Salix* spp. in Austria, Bohemia and South Tyrol. The larvae of *R. obscurus* and of *Taeniothrips dianthi*, Pr., which attacks the leaves of carnations in Lower Austria, are described together with the pupal and larval stages of *T. salicis*, Reut., a pest of willows.

GRASSE (P. P.). **Quelques charançons coupe-bourgeons de la vigne.**—*Progres agric. & vitic.*, lxxix, no. 24, pp. 572–575. Montpellier, 17th June 1923.

Bud-cutting weevils have been the cause of considerable losses in the vineyards of southern France. *Cneorrhinus* (*Philopedon*) *plagiatus* Schall., infests vines on sandy soil, appearing with the first warm spring days. The eggs are laid at the base of the plants; during the day the weevils hide in the soil and feed on the buds during the night. *Cynoglossum officinale* is said to be the preferred food-plant; pines, apple, wild quince, young oaks and certain vegetables are also attacked, but vines suffer severely. Another weevil, *Otiorrhynchus juvencus*, Gyll., is frequently found with the above; the larva lives in the ground during the winter and feeds on roots of vines and other low plants in light or sandy soil. The adult appears in early April, its habits resembling those of *P. plagiatus*. As the adults live for several months, they may do much damage. In the neighbourhood of Montpellier, *Peritelus senex*, Boh., has been rapidly increasing in numbers; the adult attacks not only vines but also young shoots and leaves of fruit trees and many vegetable crops. The numbers of these weevils can be greatly reduced by hand collection. The digging of trenches round vineyards to stop their migration is not very successful. A sticky band, made by mixing 2 parts Norwegian tar with 1 part coal tar and 1 part heavy oil, and either painted on the trunk or applied on a paper band, will prevent the weevils from ascending the vines in the evening. As they prefer vegetables such as peas and vetches, it would be well to intercrop the vines with such plants and thus induce the insects to leave the vines. Although insecticide sprays cannot be used to great advantage, the weevils would be poisoned by eating buds covered with a toxic substance; sprays of lead arsenate or lime might therefore be tried and would at the same time destroy *Haltica ampelophaga*.

Laboratoire de Phytopathologie.—*Var. sci. Soc. Sci. nat. Maroc*, i, no. 1, pp. 22–27. Rabat, 1st October 1921. [Received 18th June 1923.]

In this report of l'Institut Scientifique Chérifien the pests of cereal crops recorded include *Lema melanopa*; larvae, probably of *Sesamia*, in stems of wheat; *S. vuteria* (*nonagrioides*), in the stems and ears of maize; and *Calandra* (*Sitophilus*) *granaria* and *C.* (*S.*) *oryzae* in stored wheat. As the disinfection of storehouses is difficult in Morocco, the use of silos is recommended. Vegetable crops are attacked by *Pieris brassicae* and *P. rapae*, cauliflowers and cabbages being especially damaged, while *Phorbia* (*Anthomyia*)

brassicae attacks cabbages and turnips, mining in the stalks and roots. Infested plants should be pulled up and used as food for cattle. The beetles, *Cassida viridis* and *Colaspidema lineata* infest beet and lucerne, respectively.

Vines are attacked by the Sphingid, *Deilephila lineata*, and pests of fruit trees include *Prays oleellus* (*oleae*), on olives; *Euphyllura olivina* (*Psylla oleae*), injurious to olives in the larval stage in April, but kept in check by numerous enemies such as Syrphids, Hemerobiids, etc.; *Eriosoma* (*Schizoneura*) *lanigerum*, which, however, is not sufficiently numerous to render necessary the introduction of *Aphelinus* [*mali*]; *Stephanitis* (*Tingis*) *pyri*, found on a pear tree; scale insects on oranges and citrons, which are preyed upon by the Coccinellid, *Chilocorus bipustulatus*; *Icerya purchasi*, against which a Coccinellid, *Novius* [*cardinalis*], has been introduced with much success; *Pseudococcus citri*, which is not sufficiently controlled by *C. bipustulatus*, and against which *Cryptolaemus montrouzieri* is being introduced from Mentone.

Porthetria (*Liparis*) *dispar* threatens to be very numerous unless its parasites (which have not yet been studied) prove abundant and active; brushing the egg-clusters off the trees with creosote is recommended.

LATIÈRE (H.). **Le "Ver" des Pommes et des Poires.**—*Cultures fruitières*, no. 2, pp. 25–27, 3 figs. Paris, 15th June 1923.

An account is given of *Cydia* (*Carpocapsa*) *pomonella*, L., and of the damage caused by it to the apple crop. The usual arsenical treatments and the collection and burning of infested fruits are the remedies suggested.

BEDFORD (H. W.). **The Pests of Cotton in the Anglo-Egyptian Sudan.** —*Wellcome Trop. Res. Lab.*, Ent. Sec. Bull. 19, 45 pp. Khartoum, March 1923.

In view of the increase of cotton cultivation in the Sudan, the control of the insect pests of this crop and the prevention of the introduction of fresh ones is of the utmost importance.

The first part of this paper explains the injuries to which the crop is liable in all its stages, and in the second part a brief account is given of the commoner pests of cotton in the Anglo-Egyptian Sudan.

They include: insects injurious to cotton seed in store, *Corcyra cephalonica*, Stn.; insects injurious to the leaves, *Nisotra uniformis*, Jac. (cotton flea-beetle), *Laphygma* (*Caradrina*) *exigua*, Hb., *Agrotis ypsilon*, Rott. (black or greasy cutworm), Gryllids, *Schistocerca gregaria*, Försk. (*peregrina*, Ol.) (migratory locust), and *Xanthodes graellsi*, Feist. (Sudan cotton worm); sap-feeders, *Heliothrips indicus*, Bagn. (cotton thrips), *Aphis gossypii*, Glov. (cotton aphis), Aleurodids, *Empoasca facialis*, Jac. (cotton leaf-hopper), and *Tetranychus telarius*, L. (cotton red spider); pests injurious to the stems, *Sphenoptera neglecta*, Klug (cotton stem-borer), and termites; and insects injurious to the flowers and bolls, *Earias insulana*, Boisd. (spiny or Egyptian bollworm), *Platyedra* (*Gelechia*) *gossypiella*, Saund. (pink bollworm), *Diparopsis castanea*, Hamps. (Sudan bollworm), *Heliothis obsoleta*, F. (American bollworm), and *Oxycarenus hyalinipennis*, Costa (cotton stainer).

EFFLATOUN (H. C.). **A Monograph of Egyptian Diptera. (Part I. Fam. Syrphidae).**—*Mém. Soc. ent. Égypte*, ii, pt. 1, 123 pp., 6 plates. Cairo, 1922. [Received 25th June 1923.]

This monograph includes records of certain beneficial Aphid destroying species such as *Syrphus balteatus*, Deg., and *S. auricollis*, Meig.

CORBETT (G. H.) & PONNIAH (D.). **Summary of Observations on *Rhynchophorus schach*, Oliv., the "Red Stripe" Weevil of Coconuts.**—*Malayan Agric. Jl.*, xi, no. 4, pp. 79–88, 1 plate. Kuala Lumpur, April 1923.

According to Dr. G. A. K. Marshall, *Rhynchophorus schach*, Oliv., should be treated as a distinct species and not as a variety of *R. ferrugineus*, Oliv., at least until their specific identity has been proved. In future *R. schach* is to be known in Malaya as the "red stripe" not "red" weevil.

The damage to coconut palms is done in the larval stage. The eggs may be laid in any damaged portion of a palm; they hatch in about three days, and the larvae feed on the tissue, the longest tunnel observed being 6 feet 8 inches in 56 days in a nibong palm. The palms in order of their suitability for the development of the larvae are sago (*Metroxylon sagu*), nibong (*Oncosperma tigillaria*), coconut (*Coccus nucifera*), African oil (*Elaeis guineensis*), sugar or kabong (*Arenga saccharifera*) and areca or betel (*Areca catechu*). The larval stage lasts about 59 days, and 25 are spent in the cocoon, the total life-cycle being completed in less than three months.

The work of the larvae is very injurious and rapid, rendering this weevil more dangerous to the life of the palm than any other coconut pest. Many larvae may be found in the top of a single palm, but one is sufficient to cause death should it bore through the bud. The presence of this pest also sets up suitable conditions for attack by *Oryctes rhinoceros* (black beetle). The weevils are unable to lay their eggs at the bases of the leaf petioles or in the crowns (unless they have been previously injured) or in unwounded stems. As they do not visit undamaged trees, there appears to be little danger of their acting as carriers of disease from infected ones. The larvae cannot enter through toddy steps as long as they are not cut more than one inch deep or through the compact tissue. It is not advisable to pull or cut the leaves of coconut palms as eggs may be laid in the wounds thus made.

The flight capacity of the weevils (flights of 900 metres have been recorded) must be considered when breeding grounds in the vicinity of coconut plantations are being destroyed. Trapping cannot be generally recommended though under some circumstance nibong and sago palms may be successfully used for this purpose in which case the weevils must be collected frequently and destroyed. Burying at a depth of three feet does not prevent development of larvae or emergence of adults. As the life-cycle is completed in less than three months, it is essential to destroy all dead palms and refuse within that time to prevent them acting as breeding grounds. In the case of crown infection the tree should be destroyed as soon as the attack is observed. With trunk infection it may be possible to save the tree by removing the larvae, cutting away the diseased tissue and disinfecting the exposed surface to prevent decay.

South (F. W.). **Reports on the Work of the Inspection Staff, July to September and October 1 to December 31, 1922.**—*Malayan Agric. Jl.*, x, no. 10–12, pp. 264–268; and xi, no. 4, pp. 89–96. Kuala Lumpur, October–December 1922 and April 1923.

The destruction of the breeding grounds of the black beetle [*Oryctes rhinoceros*, L.] and the red stripe weevil [*Rhynchophorus schach*, Oliv.] is progressing favourably. Nettle caterpillars, *Thosea* sp., caused considerable damage to coconuts in some districts of Penang, and smudge fires were tried against them by the natives, but it is uncertain to what extent these were effective. An outbreak of *Brachartona catoxantha* was rapidly checked by crows and heavy rain. Grasshoppers, *Valanga* (*Orthocanthacris*) *nigricornis* and others, caused some damage to young coconut trees. *Plesispa reichei* also injured coconuts.

At Matang, *Nymphula depunctalis* and other rice pests were controlled partly by weather conditions and partly by clearing the grass from all canals and spraying in the nurseries with a decoction of tuba root [derris]. The rice pests recorded from other localities are *Gryllotalpa* sp., *Leptocorisa* spp., *Nephotettix bipunctatus*, *Podops coarctata*, *Tettigoniella spectra*, *Spodoptera pecten* and *Parnara mathias*.

Pests of other crops are an unidentified Fulgorid on *Citrus*; Psychids on mango, coconut and banana; a whitefly on custard apple; and *Rhytidodera simulans* (mango stem borer) on mango and durian [*Durio zibethinus*].

Mann (G. E.). **Note on Breeding-grounds of the Black (Rhinoceros) Beetle** (*Oryctes rhinoceros*).—*Malayan Agric. Jl.*, xi, no. 4, p. 97. Kuala Lumpur, April 1923.

The discovery of grubs of *Oryctes rhinoceros* under the ash heaps round the base of trees and in decaying trunks of kabong (sugar palm) used as pig food on premises adjoining a coconut plantation show how important it is to make a detailed inspection of all likely breeding places within a 400 yard radius of infested trees.

Altson (A. M.). **On the Method of Oviposition and the Egg of** *Lyctus brunneus*, **Steph.**—*Jl. Linn. Soc.*, Zool., xxxv, no. 234 pp. 217–227, 1 plate, 2 figs. London, June 1923.

The eggs of *Lyctus brunneus*, Steph., are deposited in the tracheae or pores of the wood, and therefore timbers with an extensive vascular system are most liable to heavy attacks. Incubation lasts fifteen days but the larvae do not hatch at once as they feed on the residual yolk mass contained in the anterior part of the egg.

The method of oviposition is the same in *L. planicollis* and will probably be found to be a generic characteristic of the wood-infesting *Lyctus* beetles.

The timber used during these observations was obtained from a London timber yard and consisted of West African mahogany (*Khaya* sp.), *Quercus robur*, Italian walnut (*Juglans regia*) and black locust (*Robinia pseudacacia*).

Stewart (H. G.). **A Chalcid Parasite of** *Pityogenes bidentatus*, **Herbst.** —*Ent. Mo. Mag.*, lix, p. 138. London, June 1923.

Etroxys dimidiatus, Wlk., has been bred from *Pityogenes bidentatus*, Hrbst., taken in May, 1922, near Aberdeen. This is apparently the first record of this Chalcid as a parasite of *Pityogenes*.

LEFROY (H. M.). **Manual of Entomology, with special Reference to Economic Entomology.**—Demy 8vo, xvi+541 pp., 4 plates, 179 figs. London, Edward Arnold & Co., 1923. Price 35*s.* net.

This volume, prepared with the assistance of several of the author's students, is based upon the lectures given as the second of three parts of a course occupying one year's training in economic entomology, and is intended to interest the student of biology and applied entomology rather than the systematist, morphologist or evolutionist. The author deplores the continual changes of insect names on grounds of priority, and has endeavoured to follow a line between that of the ultra-conservative and that of the ultra-nomenclaturist in these matters; he does not encourage identification from figures and considers that every student should work with a collection, and when reading up a group, have actual specimens to examine and dissect.

The manual is arranged by Orders (twenty-six in number, with a table showing the corresponding Orders in the *Cambridge Natural History* and in Sedgwick's *Textbook of Zoology*). The structure and morphology of the families is but lightly treated. These number over 400, of which only about 25 per cent. are regarded as of economic importance, and in the case of these the bionomics and control measures are rather more fully dealt with, while a reference to a recent monograph is included in each case. By merely quoting the author's name and the year of publication, lengthy bibliographies are dispensed with, it being the author's intention that the reader should consult the *Zoological Record, Genera Insectorum* and the *Review of Applied Entomology* for more complete references.

Fruit Tree Pests.—*Govt. N. Ireland*: *Minist. Agric.*, Leaflets nos. 10, 11 and 12; 3, 4 and 5 pp.

These three leaflets deal respectively with apple Capsids, Aphids and apple sucker [*Psylla mali*, Först.], and caterpillars, the latter including the winter moth [*Cheimatobia brumata*, L.], the mottled umber moth [*Hybernia defoliaria*, L.], the march moth [*Anisopteryx aescularia*, Schiff.], the codling moth [*Cydia pomonella*, L.], the lackey moth [*Malacosoma neustria*, L.], the small ermine moth [*Hyponomeuta padellus*, L.], and the magpie moth [*Abraxas grossularia*, L.], as well as the apple sawfly [*Hoplocampa testudinea*, Klg.], and the currant and gooseberry sawfly [*Pteronus ribesii*, Scop.].

The general habits of these pests are briefly described, and recommendations are made for their control.

CARPENTER (G. H.). **Cabbage Caterpillars.**—*Jl. Dept. Agric. & Tech. Instr. Ireland*, xxiii, no. 1, pp. 12–14, 6 figs. Dublin, May 1923.

An account is given of the caterpillar pests of cabbages, *Pieris brassicae* (large white butterfly), *P. rapae* (small white), *P. napi* (green-veined white), and *Barathra* (*Mamestra*) *brassicae* (cabbage moth). Remedial measures suggested are handpicking and crushing the caterpillars and the eggs on the leaves, destroying the early butterflies and collecting and destroying the pupae on walls and fences. The pupae of *B. brassicae* should be exposed by winter digging. Poison sprays are not recommended, but repeated drenchings with soap and water

or salt and water (2 oz. to 1 gal.) are often effective on a large scale if begun early and persevered with. Slaked lime or lime and soot applied as a dust when the plants are damp will repel these and other pests. The beneficial Ichneumonid, *Apanteles glomeratus*, which parasitises the caterpillars, should not be destroyed.

MURPHY (P. A.). **Investigations on the Leaf-roll and Mosaic Diseases of the Potato.**—*Jl. Dept. Agric. & Tech. Instr. Ireland*, xxiii, no. 1, pp. 20–34, 11 figs. Dublin, May 1923.

This study of potato diseases included an investigation of the insect carriers of the infection of leaf-roll. Besides Aphids, which are the known carriers of the disease, the Capsid, *Calocoris bipunctatus*, the Jassid, *Typhlocyba ulmi*, the flea-beetle, *Psylliodes affinis* and the frog-hopper, *Philaenus spumarius*, were all tested, and, with the exception of some doubt in the case of the last-named, all appear to be carriers.

The occurrence of Aphids on the sprouts of potato tubers stored in boxes and elsewhere has frequently been recorded, and it has been shown that infection by this means is also possible in that stage of the plant's growth. It is probable that mosaic disease also may be propagated by Aphids during storage. Infestation during storage can, however, be prevented by fumigation with tetrachlorethane, used at the rate of 1 lb. per 1,700 cu. ft. With this amount, distributed in a room tightly closed for three days, about 15 cwt. of potatoes were successfully treated. All Aphids were eliminated by this means.

WATSON (J. R.). **An Addition to the Thysanoptera of Florida.—xi.** —*Florida Ent.*, vi, no. 4, p. 58. Gainsville, Fla., April 1923.

The female of *Hoplandrothrips xanthopoides*, Bagnall, is described from Florida, where it was collected from *Moringa oleifera*, *Ziziphus mauritiana*, *Atalaya hemiglauca* and *Randia tomentosa*.

SMITH (R. E.) & MARTIN (J. P.). **A self-mixing Dusting Machine for applying Dry Insecticides and Fungicides.**—*Cal. Agric. Expt. Sta. Bull.* 357, pp. 497–506, 4 figs. Berkeley, Cal., April 1923.

In view of the many difficulties attending the use of nicotine dust as an insecticide, a machine has been devised for mixing the ingredients that effects great saving in expense, and entails no loss of nicotine nor carrying over of mixtures and consequent deterioration after the season has ended. With this machine, which is described and figured, it is possible to apply the dust hot and to mix in any desired proportions. The idea is at present only applicable to a large power machine, and is impracticable where hand machines are employed or where the work is only on a small scale.

HOLLOWAY (T. E.). **Methods of Controlling Sugar Cane Insects.**—*Louisiana Planter & Sugar Manufacturer*, lxx, no. 22, pp. 464–465. New Orleans, 2nd June 1923.

This paper summarises various attempts to control sugar-cane insects in different countries. The use of paradichlorobenzene against borers in seed cane is recommended if applied with extreme care, but its use is difficult for plantation purposes. The parasite [*Euzenilliopsis diatraeae*, Towns.] introduced to Louisiana from Cuba [*R.A.E.*, A, viii, 169] is still established, but is unable to exercise any marked

degree of control owing to the climate and the long period of inactivity on the part of the sugar-cane moth borer (*Diatraea saccharalis*), during which time the parasite has no means of maintaining itself. Any parasite brought to Louisiana from the tropics, where the cane grows all the time and borers are active, would find the same difficulty. In order not to destroy the native Chalcid parasite (*Trichogramma minutum*), the cane leaves and trash are no longer burnt in most plantations, but are allowed to decompose [*R.A.E.*, A, ii, 279]. The destruction of all scraps of cane left about the fields and mills greatly reduces infestation. It is suggested that as an experiment the plant cane fields should be grouped on one side of the plantation and stubble fields on the other, in the hope that the plant cane would bear most of the borer attack, leaving the stubble relatively free. During the following year the new seed cane on the old stubble fields would be less attacked, and from then on the infestation would theoretically decrease. This would preclude the growing of second year stubble, but maize could be grown on both sides of the plantation as usual. The soaking of cane in hot water to eliminate borers is also advocated [*R.A.E.*, A, xi, 254].

BRITTAIN (W. H.). **The Morphology and Synonymy of** *Psyllia mali*, **Schmidberger.**—*Proc. Acadian Ent. Soc. 1922*, no. 8, pp. 23–51, 6 plates, 1 fig. Fredericton, N.B., April 1923.

The contents of this paper are indicated by its title, the reasons for considering *Psylla*, auct., invalid and for adopting *Psyllia*, Kirkaldy, being given.

LATHROP (F. H.). **Influence of Temperature and Evaporation upon the Development of** *Aphis pomi*, **DeGeer.**—*Jl. Agric. Res.*, xxiii, no. 12, pp. 969–987, 8 figs. Washington, D.C., 24th March 1923.

To test the importance of the influence of temperature and evaporation upon Aphid development, a series of observations were made on young apple trees enclosed in cheesecloth bags. The technique of the experiments is described. The author's conclusions are that under normal outdoor conditions there is a general correlation between atmospheric evaporation and the rate of development of *Aphis pomi*. Atmospheric evaporation, as measured by the standard instrument used, does not serve as a satisfactory index to the rate of development of *A. pomi*. Temperature, during periods when no other factor limits the rate of development of the species, constitutes a more satisfactory index than does the rate of atmospheric evaporation. The relation of temperature to the rate of development of *A. pomi* may be represented by a hyperbolic curve having the formula: length of developmental period in days $= \dfrac{180}{\text{Temperatures in degrees F.} - 41}$. Plant growth frequently constitutes a factor limiting the rate of development of *A. pomi* feeding on slowly growing foliage.

PINCKNEY (R. M.). **Action of Soap upon Lead Arsenates.**—*Jl. Agric. Res.*, xxiv, no. 1, pp. 87–95. Washington, D.C., 7th April 1923.

From the experiments here described it is concluded that pure soaps dissolve arsenic from both diplumbic ortho arsenate (also called "monoplumbic," "acid," or simply "lead" arsenate) and triplumbic ortho lead arsenate (also called "neutral" lead arsenate), which are

here referred to as " M " and " T " respectively, and therefore might cause injury to foliage. Sodium stearate is much more effective in dissolving arsenic from both " M " and " T " than sodium oleate, 2–6 or even 7 times as much soluble arsenic being found in a solution of the former as in one of the latter.

As already pointed out by previous workers the arsenic of " M " is much more acted upon than " T." Increasing the concentration of the stearic soap solution increases the amount of arsenic made soluble. An increased concentration of the oleic soap increases the soluble arsenic from " M " but not from " T." The extent of the action was sometimes greater when the lead arsenate was ground in water than in the soap, sometimes less. No definite statement can be made as to which is more effective. Sodium stearate dissolves far too much arsenic from " M " to confirm the supposition that its action stops with the conversion of diplumbic arsenate into lead hydroxy-arsenate. Both sodium stearate and sodium oleate dissolve arsenic from " T," the former in large quantities (as much as 25 per cent.). This indicates that the action of soaps on lead arsenates is of the double decomposition sort.

The danger of injury from soluble arsenic in spraying with lead arsenates and soap can be largely eliminated if the soap is entirely made from oleic acid.

Brittain (W. H.). **Five Years Spraying and Dusting Experiments.**—*59th Ann. Rept. Fruit Growers' Assoc., Nova Scotia, 1923*, pp. 53–72. Kingston, N.S., 1923.

During 1922 there was widespread complaint of injury from the use of both Bordeaux spray and dust on apples, but it has been demonstrated that this injury occurs where there is a bad infestation of apple sucker [*Psylla mali*] that permits of and aggravates Bordeaux injury. It does not occur where this pest has been controlled with nicotine.

A brief account is given of the bionomics of *Anthonomus signatus* (strawberry weevil). Dusting with 90–10 or preferably 85–15 sulphur-lead arsenate applied at the rate of 60–80 lb. an acre, according to the density of growth, width of rows, etc., is recommended. The first application should be made as soon as the weevils are found feeding, and the second a week later. The buds should be kept covered with dust till they open.

Figures obtained from individual experiments with various sprays and dusts, particularly where these have been carried out on the same orchard for a period of years, are given, together with the percentage of yield in comparison with untreated trees. Figures are also given that fairly represent the actual percentages of different grades of apples obtained in the entire district, showing the condition of each year's crop as regards freedom from insect and fungous blemishes.

The relative merits of lime-sulphur, Bordeaux, soluble sulphur-lime, lead arsenate, 90–10 sulphur-lead-arsenate dust, and Bordeaux dust are discussed.

Kelsall (A.). **Control of Orchard Pests.**—*59th Ann. Rept. Fruit Growers' Assoc., Nova Scotia, 1923*, pp. 95–106. Kingston, N.S., 1923.

A brief outline is given of the insecticidal investigations that have been carried out at Annapolis. In the control of biting insects the dust composed of 90 parts sulphur and 10 parts lead arsenate proved

markedly superior to the spray calendar as generally followed in Nova Scotia. The Bordeaux dust has given a control of biting insects not quite equal to that of the regular spray calendar.

The results of experiments with sulphur show that on each variety of apple and for each insect under consideration, the control was greatest on the area dusted with 90–10 sulphur-lead arsenate, but there was also a considerable, though less effective, control on the area treated with sulphur and infusorial earth. Tests proved that aluminium sulphate is a very poor fungicide in comparison with copper sulphate. Nicotine vapour projected from a dusting machine to control sucking insects has proved promising. Experiments are being made to find a method of using white arsenic in Bordeaux mixture. Calcium caseinate has been used in all the standard sprays, but under Nova Scotia conditions it is doubtful whether the extra expense it involves is justified, though it might be added to the spray with advantage in the case of an orchard which has had a heavy infestation of some insect that is only a partial surface feeder, such as the bud-moth [*Eucosma ocellana*] or codling moth [*Cydia pomonella*]. In the eastern end of the fruit-growing belt the apple sucker [*Psylla mali*] is spreading. Where it is very numerous and a spray schedule is being followed, nicotine should be added to the spray, and where a dust schedule is being followed, a nicotine impregnated dust may be used. If it is not thought to be serious enough to warrant the expense of a nicotine dust, the use of 90-10 sulphur-lead arsenate and not Bordeaux dust is advised. Where trees are dusted when in bloom, a dust should be used from which the arsenic has been omitted in order to avoid the destruction of bees as much as possible.

Hawley (I. M.). **Insects and other Animal Pests injurious to Field Beans in New York.**—*Cornell Univ. Agric. Expt. Sta.*, Mem. 55, pp. 949–1037, 3 plates, 16 figs. Ithaca, N.Y., May 1922. [Received 28th June 1923.]

Hylemyia cilicrura, Rond. (*Phorbia fusciceps*, Zett.) (seed corn maggot) may occur in a bean field in great numbers in one season and not reappear in or near that field in the following season. The flies usually disappear in late summer, and the food-plants of the larvae during that period are not definitely known. Infestations in cultivated crops are not generally discovered until considerable damage has been caused, and by that time the larvae are full-grown. The systematic position of this fly, its history and distribution are discussed. The range of food-plants is wide, and they include beans, peas, lettuce, maize, cabbage, cauliflower, beets, turnips, radishes, sweet potatoes, seed potatoes, garlic, crimson clover, onions and hedge mustard. Development may also take place in decaying organic or vegetable matter. When attacking beans, feeding may take place on the plumule, cotyledons or radicle; the injury to each part of the plant is discussed. All stages of the insect are described.

Adults of the first generation are found in the fields from early May to mid-June and deposit their eggs on decaying material or on moist soil about bean-planting time. The larvae live in beans, maize, potatoes or rotting vegetables, and emerge as second-generation flies in July. These adults soon disappear. A few third-generation flies appear in August and September, some of which may hibernate, but most of the flies taken in May of the next year are believed to come from the midsummer generation of pupae that

have hibernated. The average time of incubation seems to be 2·8 days. Oviposition lasts only a few days, and one female may deposit as many as 80 eggs, though the number is often probably much less. It is the first generation larvae that are most injurious to the growing crops, and this stage seems to last from 8–12 days. The young larvae crawl through crevices of the soil in search of food, showing a preference for material that is beginning to rot, and especially for decaying beans. The pupal stage seems to last about 12 or 13 days, the puparia being found near the surface of the ground, a short distance from the place where the larva has been feeding. Adults have been observed to live on an average 26 days, the preoviposition period lasting about 2 weeks. The manner of hibernation has not been determined, but the author believes that the insects generally pass the winter as second-generation pupae.

Various artificial remedial measures have been tried, including coating the seed before planting and treating the soil with repellents, but none gives any promise of success. As wet conditions are most favourable for oviposition, it is best to plant when the soil is dry and the earth warm. The soil should first be disked and harrowed and then rolled, and finally, after a few warm days, the beans should be planted. The use of fertilisers improves the chance of a good crop, but fields fertilised with fresh manure just before ploughing often show a heavy infestation; this condition should therefore be guarded against in wet years. As the flies frequently develop in decaying matter in the soil, it is sometimes better to work the field early, before most of them are sexually mature, so that it will be dried and less attractive for oviposition. If planting cannot be done before the first generation is ready for oviposition, it had better be delayed until the flies are less numerous. It is important that beans should not be planted too deep in wet soil, or they will tend to rot and be more attractive to the flies. The seed should be forced to germinate and grow as rapidly as possible, as the plants will escape serious injury when they are once above ground.

Systena taeniata, Say (pale-striped flea beetle) is more or less numerous in the bean fields of New York State every year, and in dry summers may cause great injury to bean foliage. The food-plants include many common vegetable and fruit crops, but certain weeds are apparently preferred, particularly ragweed and lamb's-quarters. The stages of the insect are described. The beetles emerge in June and July and oviposit from July to September in the ground, close to their favourite food-plants. The eggs generally occur singly, though they may be in clusters of from 2–7, and hatch in 2 or 3 weeks. The newly hatched larvae feed on the roots of weeds, but have not been found feeding on those of beans. The larvae hibernate after feeding for some time, so that the larval stage lasts about 9–11 months. During June and July of the next year the larvae pupate and the beetles appear in 2 or 3 weeks. In New York there is only one generation in a year. Clean cultivation is very important. If weeds, and particularly the favourite food-plants are eradicated from the sides of bean fields and from among the plants in late August, the young larvae will be without food and will die, and if sod-land or stubble containing the weeds be ploughed deep in September, when the larvae are small, the infestation in the following spring will probably be much reduced.

Systena frontalis, F. (red-headed flea-beetle) causes similar damage, many of its food-plants being the same. The stages are described. The adults emerge in July and August and after feeding enter the ground for oviposition during August and September. The eggs are

scattered irregularly about the roots of the food-plants from ½–2 in. deep, and the winter is passed in this stage, the eggs hatching in May of the following year. The egg period covers about 9 months; little is known of the larval and pupal stages, but the larvae probably feed on the roots of ragweed, beggar-ticks and other weeds, pupating some time in June. Clean cultivation as suggested for *S. taeniata* is equally essential against *S. frontalis*. The removal of weeds from fields after oviposition in autumn and again before hatching in the spring should destroy large numbers.

A number of insecticides have been tested against these beetles; of these, Bordeaux (5 : 5 : 50) with lead arsenate (3 : 50) has given the best results, lead arsenate alone being nearly as effective. Lead arsenate acts as a repellent as well as an insecticide. Sprays of limewater, sulphur and fish-oil soap also repel the beetles, though to a less extent, and fertilisers dusted on the plants have some repelling power. If infestation is heavy in July, the spray is recommended, but if suitable machinery is not available for spraying, the plants may be dusted with lime alone or with lead arsenate and lime.

Plathypena scabra, F. (green clover worm) is only occasionally a serious pest of beans in New York State, the larvae of the second generation being voracious feeders, making large holes in the leaves and sometimes in the pods. The food-plants include various beans and peas, strawberry, blackberry, lucerne, and several weeds. Hibernation generally occurs in the adult stage, the moth crawling into buildings, bark of trees, or any place of shelter from the cold. In normal winters, numbers are killed by the frost. The larvae are parasitised by *Rhyssalus loxoteniae*, Ashm., and by *Aleiodes intermedius*, Cress. There are generally two broods of the moth, and in long warm summers there may be a partial third generation. A spray of 2–3 lb. lead arsenate paste to 50 U.S. gals. of water will destroy the larvae if both sides of the leaves are thoroughly covered. Soy beans can be dusted, as soon as infestation occurs, with 1 part powdered lead arsenate to 8 parts lime. On wax and string beans, 1 gal. nicotine sulphate to 750 gals. of water, with 3 lb. soap to each 50 gals. of water is safer, and in small gardens, a teaspoonful of the nicotine sulphate with 1 oz. laundry soap in 1 gal. of water is effective.

Bruchus (*Acanthoscelides*) *obtectus*, Say (bean Bruchid) is well known as a pest of stored beans, but is not serious in the fields in New York State owing to the severity of the winter, which destroys large numbers. Seed from the crop can be safely kept if stored in a cold place.

Minor pests briefly dealt with include *Julus coeruleocinctus*, Wood (blue-banded millipede); *Trifidaphis radicicola*, Essig (solanum root aphis); *Agriotes mancus*, Say (wheat wireworm); *Tetranychus telarius*, L. (red spider); *Lachnosterna* (*Phyllophaga*) sp. (white grubs); *Macrodactylus subspinosus*, F. (rose chafer); *Diabrotica duodecimpunctata*, F. (southern corn rootworm); *Ceroloma trifurcata*, Forster (bean leaf beetle); *Empoasca mali*, LeB. (apple leaf hopper), *Melanoplus atlantis*, Riley, *M. femur-rubrum*, DeG., and *M. bivittatus*, Say (grasshoppers); and various Rhynchota injurious to the pods, including *Adelphocoris rapidus*, Say, *Euschistus variolarius*, P. de B., and *Lygus pratensis*, L.

An enquiry has been instituted into the rôle of insects in the transmission of bean diseases. Tests were made with *S. frontalis*, *A. rapidus*, *E. mali*, *Coccinella novemnotata* and *Lygus pratensis*, for possible means of transmission of the bacterial blight of beans, caused by *Bacterium phaseoli*, but all proved negative. It is thought possible that *A. rapidus* may be capable of transmitting bean blight, but most of the

evidence obtained as yet is negative; further tests should also be made with *L. pratensis* and *E. mali*. It has been found by other workers that bean mosaic can be transferred from one bean plant to another by means of an undetermined Aphid, but that *E. mali, L. pratensis, S. hudsonius, S. frontalis, Epitrix cucumeris* and *T. telarius* seem unable to transmit the disease.

THOMAS (E. E.). **The Citrus Nematode,** *Tylenchulus semipenetrans*.—*Cal. Agric. Expt. Sta.*, Tech. paper no. 2, 34 pp., 8 plates. Berkeley, Cal., February 1923.

Tylenchulus semipenetrans (citrus nematode) is injurious in California to *Citrus*, which seems to be its only food-plant. The female Nematodes live with the anterior portion of the body thrust into the growing tissue of the root and rootlets on which they feed. The life-cycle takes from 6–8 weeks, and as many eggs are laid by each female, increase is very rapid. Badly infested trees appear stunted, with the leaves small and yellowish and the fruits small and unmarketable. In older citrus groves as many as 75 per cent. may be infested. This Nematode occurs more abundantly in loose, sandy soil, but no type of soil is free from it. It is very easily distributed—on nursery stock, in earth clinging to implements, the hoofs of animals, etc., or in soil carried from place to place by storm water.

Treatment has been tried with many chemicals but none were successful, and fertilisers, even though used for a number of years, were ineffective. The best results for nursery trees were obtained by dipping the roots in water at 130° F. for 20–30 seconds. This does not destroy all the Nematodes present, but greater heat is likely to injure the trees. Nursery trees should be grown on uninfested soil, so that new plantings may be free from attack.

HEINRICH (C.). [U.S. Bur. Ent.] **Revision of the North American Moths of the Subfamily Eucosminae of the Family Olethreutidae.**—*U.S. Nat. Mus.*, Bull. 123, 298 pp., 59 plates. Washington, D.C., 1923.

This important systematic work deals with many moths of economic importance.

BRÈTHES (J.). **Primera contribución para el conocimiento de los "Strepsiptera" argentinos.** [A First Contribution to the Knowledge of Argentine Strepsiptera.]—Reprint from *Revista de la Facultad de Agronomia de la Plata*, xv, no. 1, 18 pp., 4 plates. La Plata, 1923.

Descriptions are given of ten new species of Strepsiptera from Argentina, all of them being parasitic on Hymenoptera.

BRÈTHES (J.). **Description d'un nouveau genre et une nouvelle espèce d'Ipidae du Chili.**—*Rev. Chilena Hist. Nat.*, xxv, pp. 433–435, 1 fig. Santiago, 1921. [Received 21st June 1923.]

A Scolytid, near *Hylastes*, *Sinophloeus porteri*, gen. et sp. n., is described from specimens taken on *Notophagus obliqua* in Chile.

BRÈTHES (J.). **Descripción de varios coleópteros de Buenos Aires.**—Reprint from *Anales Soc. Cient. Argentina*, xciv, pp. 263 et sqq. 45 pp., 9 figs. Buenos Aires, 1922.

Among the new beetles described are a Nitidulid, *Pycnocephalus argentinus*, from twigs of *Baccharis platensis* infested with *Ceroplastes* on which it is known to feed; a Corylophid, *Arthrolips semilunaris*, and two Lathridiids, *Enicmus pampicola* and *Cartodere oeceticola*, all three from the webs of *Oeceticus kirbyi* var. *platensis*, Berg.; and a Scolytid, *Acorthylus asperatus*, gen. et. sp. n.

GAUTIER (C.). **Un Aleurode Parasite du Poirier et du Frêne,** *Trialeurodes inaequalis*, **n. sp.** (**Hem. Aleurodidae**).—*Ann. Soc. ent. France*, xci (1922), no. 4, pp. 337–350, 1 plate. Paris, 10th June 1923.

Trialeurodes inaequalis, sp. n., is described from Lyons as injuring ash and pear trees on walls. All stages may be found at once on the lower surface of the leaves.

It is parasitised by an Aphelinid belonging to the genus *Prospaltella*, and the Drosophilid fly, *Gitona ornata*, Mg. (*Acletoxenus formosus*, Lw.), the larva of which is predacious, and *Scymnus arcuatus*, Rossi, were found associated with it.

MALPEAUX (—). **Destruction des vers blancs.**—*La Vie Agric. et Rur.*, xxii, no. 25, p. 421, 1 fig. Paris, 23rd June 1923.

A brief account is given of the usual measures adopted for the control of white grubs [*Melolontha melolontha*, L.].

FAURE (J. C.). **Les Baridies Charançons nuisibles aux Choux.**—*Rev. Zool. agric. & app.*, xxii, nos. 2 and 3, pp. 35–43 and 84–92, 6 figs. Bordeaux, February and March 1923.

Cabbages of many varieties have been seriously damaged by *Baris chlorizans*, Germ., *B. laticollis*, Marsh., and *B. cuprirostris*, F., in the neighbourhood of Lyons. The various stages and the life-history of these species are described [*cf. R.A.E.*, A, ix, 527]. The winter is passed in the larval, nymphal or adult stage, for which purpose the beetles enter the soil. The first adults may be seen towards the middle of August and sometimes give rise to a partial second generation, the larvae of which are not numerous and cause little damage. A list of the natural enemies of these beetles includes the following observed by the author in France: *Bracon glaphyrus*, Marsh., *B. variator*, Nees, *Eurytoma curculionum*, Mayr, and *Pteromalus* sp.

The only method of dealing with these pests is to prevent oviposition and to encourage the multiplication of parasites by means of suitable cultural measures. Berlese recommends a milk of lime spray for the former purpose.

DUFILHO (E.). **L'arséniate diplombique et son utilisation agricole.**—*Rev. Zool. agric. & app.*, xxii, no. 3, pp. 93–95. Bordeaux, March 1923.

All French commercial arsenical powders give triplumbic arsenate when mixed with water, and as the results obtained with these solutions at the entomological experiment station of Bordeaux were not

satisfactory, attempts have been made to produce a diplumbic arsenate that is as stable, as light and as adherent as possible. The results of these experiments show that lead arsenate obtained by double decomposition, molecule for molecule, from sodium arsenate and nitrate of lead at a temperature below 50° C. [122° F.] is as near as possible to pure diplumbic arsenate. As an internal insecticide it should be used in a paste form suitably diluted. It remains in suspension long enough to be of value as a plant spray and is more adherent than other lead arsenates.

FEYTAUD (J.). **La question doryphorique au début de la campagne de 1923.**—*Rev. Zool. agric. & app.*, xxii, no. 3, pp. 65–84. Bordeaux March 1923.

A detailed account is given of the measures recommended against *Leptinotarsa decemlineata*, Say, in France, most of which have already been noticed. The immediate need for a rigorous and continued campaign is particularly emphasised.

PAOLI (G.). **La Formica dell'Argentina.** [The Argentine Ant.]—*Città di Sanremo. Consorzio Obbligatorio di difesa contro la Formica Argentina*, 15 pp., 7 figs. San Remo, 1923.

The Argentine ant, *Iridomyrmex humilis*, Mayr, has become a serious pest on the French and Italian Riviera since its introduction. An association, membership of which is compulsory, has been established at San Remo to combat it. This pamphlet gives a description of this ant, its habits and the measures required to be taken against it, and reproduces the decrees respecting it issued by the Italian Ministry of Agriculture and the Prefect of the Province of Porto Maurizio in which San Remo is situated.

PAOLI (G.). **La "rissetta" delle viti.** [The "rissetta" Curl of Grape Vines.]—*Redia*, xv, pp. 181–189, 2 figs. Florence, 15th June 1923.

Since July 1921 vines on the Ligurian Alps have suffered from an affection that destroys the flowers and weakens the plants. The trouble consists chiefly in a shortening of the internodes and a distortion of the leaves which are also perforated. This serious injury seems to be due to a Capsid bug of the genus *Lygus*.

MALENOTTI (E.). **La cura del grano nei magazzini.** [The Treatment of Grain in Warehouses.]—*R. Osservatorio fitopatologico per Verona e Province limitrofe*, 12 pp., 6 figs. Avesa (Verona), 1923.

The pests dealt with are *Sitotroga cerealella*, *Tinea granella*, *Plodia interpunctella*, *Calandra granaria*, *C. oryzae*, *Tribolium confusum*, *T. castaneum* (*ferrugineum*), *Tenebroides mauritanicus*, and *Silvanus surinamensis*. Brief notes are given on the habits of each species and the usual methods for disinfesting storehouses are described. Natural control by means of the parasite *Dibrachys boucheanus* and the predacious mite, *Pediculoides ventricosus*, is briefly mentioned.

SPEYER (W.). **Ueber die Lebensdauer des Apfelblütenstechers** (*Anthonomus pomorum*, **L.**) **und die Entwicklung seiner Geschlechtsorgane.** [The Length of Life of the Apple Blossom Weevil, *A. pomorum*, and the Development of its Sex Organs.]—*Zeitschr. Schädlingsbekämpfung*, i, no. 2, pp. 68–70, 4 figs. Berlin, May 1923.

The author's belief that *Anthonomus pomorum*, L., may have two oviposition periods [*R.A.E.*, A, x, 617] has been confirmed by further experiments. In one instance a pair of weevils that had produced over 80 eggs in 1922, began feeding again in March 1923, and mated on 31st March. On the following day oviposition began, and by 23rd April the female had deposited 64 eggs.

A female emerging from the pupa in June seeks its winter quarters in July while still immature. It is still immature when it begins feeding towards the end of March, and then it oviposits in April. Any spermatozoa left in the receptaculum at the end of this first oviposition period are carried into hibernation and are still active in March of the following year. Mating again occurs and is followed by the second oviposition period. The males also have two breeding periods.

GLEISBERG (W.). **Beitrag zur Obstmadenfrage. I.** [A Contribution to the Apple Maggot Question.]—*Zeitschr. Schädlingsbekämpfung*, i, no. 2, pp. 70–89, 5 figs. Berlin, May 1923.

Previous work in Germany on *Cydia pomonella* has been based on estimations of infestation and on incomplete observations on the amount of fallen and infested fruits. It was found that only 22·7–25·5 per cent. of fallen fruit were infested, and these would, in most cases, have fallen even if not infested. The amount of fallen fruit in these experiments 16·9–17·4 per cent. of the total crop) depends partly on soil and climate but is largely a matter of varietal and individual tree physiology. Some fruits fall as a result of unnatural ripening caused by infestation by *C. pomonella*, but the large numbers of infested fruit left on the tree go to prove that infestation is not the main agency that causes the fall.

Calyx infestation is important from the point of view of spraying with arsenicals. It is suggested that the calyx is sought for as a shelter and not because it is preferred for feeding. In fallen infested fruits calyx infestation amounted to 86·2 per cent. These data show that collection of fallen fruit and trap banding are both valuable preventives. Spraying with arsenicals reduces the total amount of fallen fruit and the total infestation. The effect of spraying is to reduce the falling of fruit by influencing the physiological conditions of the tree that give rise to it; to increase the proportion of infested fruit in fallen fruit and decrease this proportion in that which remains on the tree; and to kill the larva, thus reducing the total infestation. This means an increased crop of better quality.

SCHEIDTER (F.). **Zur Lebensweise unserer Holzwespen.** [On the Life-history of our Wood Wasps.]—*Zeitschr. Schädlingsbekämpfung*, i, no. 2, pp. 89–98, 6 figs., 1 plate. Berlin, May 1923.

The wood wasps found in the Frankenwald, Bavaria, are *Sirex augur*, Kl., and *S.* (*Paururus*) *noctilio*, F., both of which occur in silver fir and also in the spruce growing near. Neither *S. gigas* nor *S.* (*P.*) *juvencus* were met with. The discrepancies in existing records of infestation in Germany are probably due to the different localities

and to the local predominance of a given conifer. The author has observed that *S. gigas* and *S. augur* attack the biggest stems, whereas *S. juvencus* and *S. noctilio* prefer poles, probably because their short ovipositors cannot pierce thick bark. In the Frankenwald, the females of *S. augur* were seen ovipositing quite close to the ground; in one instance only was oviposition seen at a height of 16 inches. Oviposition occurred only on standing silver fir and not on adjacent spruce. The injury has no other result than a depreciation of the value of the timber, which is, however, serious in the Frankenwald.

The females of *S. augur* and *S. noctilio* deposit eggs only in the late afternoon. An account of the method of oviposition is given. Dissection showed that females of *S. augur* contain an average of over 1,000 eggs each; in *S. noctilio* the number is about 400. The larval mines run indifferently upward or downward. Some pupae were found at a depth of 4¾ inches from the surface of the trunk. As regards the proportion of the sexes very few males (10) were found among several hundred females of *S. augur*, and the same applies to *S. noctilio*, except that in one instance three-fourths of a catch of the latter were males. Woodpeckers are the principal natural enemies of wood wasps, and the marks made by them are useful indications of infestation. An Ichneumonid, *Rhyssa persuasoria*, is a parasite of some importance. Two large ants, *Camponotus ligniperda* and *C. herculeana*, use the holes as entrances and extend the existing injury. Mines due to a beetle, *Hylotrupes bajulus*, are sometimes mistaken for those of Siricids, which are, however, truly circular, whereas the beetle mines are oval in section. The author does not consider that there are any practicable artificial measures against these insects.

WANDOLLECK (B.). *Attagenus pellio*, **L., als Schädling in Wohnungen.** [*A. pellio* as a Pest in Dwellings.]—*Zeitschr. Schädlingsbekämpfung*, i, no. 2, p. 101. Berlin, May 1923.

A mysterious infestation in a newly decorated house by a beetle *Attagenus pellio*, L., was finally traced to felted matter (consisting of woollen hairs, dust and small feathers) that had accumulated behind the skirting boards. When the painting done during redecoration had closed the normal exits of the beetles, they appeared in the rooms.

MENZEL (R.). **De mogelijkheid eener bestrijding van** *Heterodera radicicola* **(wortelaaltje) en andere voor planten schadelijke aaltjes door middel van roofaaltjes, in het bijzonder door** *Mononchus papillatus*, **Bastian.** [The Possibility of Control of *Heterodera radicicola* and other plant-injurious Nematodes by means of predatory Nematodes, especially by *Mononchus papillatus*, Bastian.]—Reprint, pp. 1–2, from *De Thee*, iv, no. 1. Buitenzorg, March 1923.

This is a Dutch translation of the paper by Steiner and Heinly already noticed [*R.A.E.*, A, xi, 146].

MENZEL (R.). **Slakrupsenplagen.** ["Slug" Caterpillar Pests.]—Reprint, pp. 3–4, from *De Thee*, iv, no. 1. Buitenzorg, March 1923.

Several complaints of injury to tea in Java by Limacodid caterpillars, especially *Setora nitens*, Wlk., have been received, and the breeding and liberation of parasites is again urged. In one instance a severe infestation by *Belippa albiguttata*, Sn., occurred.

Menzel (R.). **Over een nog onbekende schadelijke boeboek.** [An as yet unknown injurious Beetle.]—Reprint, pp. 5–6, 1 plate, from *De Thee*, iv, no. 1. Buitenzorg, March 1923.

Infestation of tea growing in a damp ravine was found to be due to two boring beetles, a species of *Xyleborus* sometimes found in tea and a beetle belonging to the genus *Scolytoplatypus*, of which *S. entomoides*, Blandf., in Celebes, and *S. hamatus*, Haged., in Java, are the recorded Dutch East Indian species. Attention should be paid to borers of this genus as they seem capable of attacking trees that are quite healthy. *Hevea* has been found to be attacked either by the same species or by one closely allied to it. In the two cases mentioned the infestation was stopped by cutting down and burning the plants involved.

Karny (H. H.). **A new *Liothrips* from Trinidad.**—*Ann. & Mag. Nat. Hist.*, xii, no. 67, pp. 160–164. London, July 1923.

Liothrips urichi, sp. n., is described from Trinidad where both sexes were taken on *Clidemia*.

Green (E. E.). **On the Type of *Monophlebus* (*Drosicha*) *contrahens* (Walk.), with Description of a new Species from Ceylon.**—*Ann. & Mag. Nat. Hist.*, xii, no. 67, pp. 168–171, 2 plates. London, July 1923.

A further description is given of *Drosicha contrahens*, Wlk., and a large Monophlebid, *D. phyllanthi*, sp. n., which was previously confused with it, from *Phyllanthus* sp. in Ceylon, is described.

Chevalier (J.) & Mercier (F.). **Action pharmacodynamique du principe insecticide des fleurs de pyrèthre.**—*C. R. hebdom. Acad. Sci.*, clxxvi, no. 25, pp. 1847–1848. Paris, 18th June 1923.

It has been found experimentally that the flowers of pyrethrum act on the muscles and cause the death of cold-blooded animals by paralysis. The lower the animal in the scale, the more quickly is paralysis established. The use, therefore, of pyrethrum as an insecticide in agriculture is urged in place of arsenical and lead preparations that are dangerous to man.

Dingler (M.). **Beiträge zur Kenntnis von *Lecanium hesperidum*, L., besonders seiner Biologie.** [Contributions to the Knowledge of *L. hesperidum* and especially of its Biology.]—*Zeitschr. angew. Ent.*, ix, no. 2, pp. 191–246, 24 figs., 2 pls. Berlin, June 1923.

This is a detailed account of observations on *Coccus* (*Lecanium*) *hesperidum*, L., from material from a number of sources, including *Laurus nobilis* in greenhouses, on which this scale occurred in company with *Aspidiotus hederae*, Vall. For convenience the three stages of development of the female are termed "larva," "nymph" and "adult." The male is not known with certainty, and there is no doubt that parthenogenetic reproduction occurs. The larva is about 0·36 mm. long by 0·21 mm. broad It is attracted to light and moves rather actively. The nymph may or may not be attached to the food-plant. The immature adult is of a flat-oval shape like the nymph. Each female gives rise to an average of 300–400 larvae, and there are 3 or 4 generations a year.

C. hesperidum is not endemic in Germany, and only one record exists of its hibernation in the open air there; this probably occurs in the egg-stage. Its spread is effected by carriage on plants and by the movement of the larvae and nymphs. Within a year the progeny of one female spreads within a radius of at least 10 yards. This is of practical importance in cases where the food-plants of the scale are near each other, as in greenhouses in nurseries.

The Chalcids, *Aspidiotiphagus citrinus*, How., *Coccophagus scutellaris*, Dalm., and *Metalophus torquatus*, Malenotti, were bred from this scale. *A. citrinus*, the most abundant species, attacks the young nymph or even the larva, and it leaves its host when it is still in the middle of the nymphal stage; *C. scutellaris*, on the other hand, only abandons its host when the latter is already of fair size. The larvae and adults of *Adalia* (*Coccinella*) *bipunctata*, L., eagerly devour the scales. The mite, *Hemisarcoptes coccisugus*, Lign., which is known to attack Coccids, was not observed.

ECKSTEIN (F.). **Zoologisch-meteorologische Studien. Erste Mitteilung: Ueber den Einfluss von Standort und Klima auf die Gradation des Kiefernspanners (*Bupalus piniarius*, L.).** [Zoological-meteorological Studies. First Communication: The Influence of Locality and Weather on the Mass Occurrence of the Pine Moth, *B. piniarius*.]—*Zeitschr. angew. Ent.*, ix, no. 2, pp. 247-305. Berlin, June 1923.

In investigating this question, the data available from outbreaks recorded during the past 40 years in Bavaria were examined.

Pines grow in light soils, and infestation is confined to these, especially if dry, though damp and marshy areas are not entirely free.

It is noticeable that in years when the moth was abundant, the rainfall in June was smaller and the temperature higher than in other years, but other factors are also involved. The larva is very resistant to moisture and even more so to cold. Weather appears to have some effect on pupation, for the largest numbers of the moth occurred in the year with the lowest rainfall in April. Very little information is available on the effect of weather on the natural enemies of *B. piniarius*. The occurrence of Hymenopterous and Dipterous parasites in large numbers has coincided in Bavaria with a decrease of outbreaks of the moth. The optimum conditions of moisture appear to be provided by an annual rainfall of about 24 in., and if this is combined with extensive areas of pines on dry, sandy soil, outbreaks of the pest may be expected.

HEROLD (W.). **Zur Kenntnis von *Agrotis segetum*, Schiff. (Saateule). III. Feinde und Krankheiten.** [A Contribution to the Knowledge of *Euxoa segetum*. III. Enemies and Diseases.]—*Zeitschr. angew. Ent.*, ix, no. 2, pp. 306-332, 8 figs. Berlin, June 1923.

This paper forms the conclusion of two others already noticed [*R.A.E.*, A, viii, 271; ix, 64].

Euxoa (*Agrotis*) *segetum*, Schiff., probably has the most natural enemies in the larval stage. These affect chiefly the older larvae. Bats, such as *Vesperugo pipistrellus*, prey on the adults, and birds, moles, hedgehogs, etc., devour the larvae. The value of poultry and other birds in the

connection, however, depends largely on the condition of the ground. Hymenopterous parasites include 8 Ichneumonids, 6 Braconids and 1 Chalcid, while Diptera are represented by 6 Tachinids, 4 Bombyliids (some of which are probably hyperparasites) and 1 Muscid (*Muscina stabulans*, Fall.). A table of these species with the dates of record and names of observers and localities is given. *M. stabulans* was obtained by the author in 1923, prior to which no Diptera had been bred from *E. segetum* in Germany. Predatory beetles and a mite, near *Uropoda paradoxa*, C. & B., are other enemies of this pest.

The infection of the larvae by a fungus, *Tarichium megaspermum*, is dealt with at some length. The age of the larvae, their feeding-habits and food-plants, and the amount of moisture in the air do not influence infection, but the soils that are rich in lime and humus and that favour *E. segetum* appear to be also those most favourable to the fungus. It infects the larvae through the mouth, legs and pseudopodia. In the outbreak of 1917 in Posen and East Prussia parasitism by Hymenoptera was negligible, that by Diptera (*M. stabulans*) was less uncommon, while infection by *T. megaspermum* was so complete that larvae free from this fungus were difficult to find in late autumn. Such infection seems to permit parasitism only by saprophytic species such as *M. stabulans*.

WILLE (J.). **Beiträge zur Biologie des Reiskäfers** *Calandra oryzae*, **L.** [Contributions to the Biology of the Rice Weevil, *C. oryzae*.]—*Zeitschr. angew. Ent.*, ix, no. 2, pp. 333–342, 1 fig. Berlin, June 1923.

In Brazil *Calandra oryzae*, L., is a most serious pest of stored maize, wheat, rye, beans and husked rice. The author has not observed any attack on rice in the husk. In the subtropical climate of southern Brazil *C. oryzae* has at least 5 generations a year. The life-cycle requires from 1½ months in summer to 5 in the cool weather of autumn and winter. In summer 6–9 days were needed for the egg-stage, 12–17 days for the larval stage, and 7–11 days for the pupal stage. Oviposition lasted at least a month, or 2 for the autumn generation. As a rule only one larva occurs in a grain of maize, but 2 or 3 have been observed. The number of eggs laid by a female appears to be 200. After emergence the adult stays in the pupal chamber for at least 3 days, and nearly all the weevils removed from it immediately after emergence died. After a further period of 7 days the adults become darker in colour and begin mating. In maize storehouses adults were taken throughout the year. The ordinary life-cycle in stored products may be interrupted by a period of life and reproduction in the open, but adults were never found in the open in winter. Reproduction and feeding in the open depends on the presence of maize, no other plant being found to serve these purposes. The weevils feed and oviposit from January to May on ripening maize of varieties in which the heads are not tightly and completely enclosed in leaf-sheaths.

UPHOF (J. C. T.). **Die moderne Insektenbekämpfung in den Vereinigten Staaten.** [Modern Methods of Insect Control in the United States.]—*Zeitschr. angew. Ent.*, ix, no. 2, pp. 343–352, 6 figs. Berlin, June 1923.

The title of this paper indicates the nature of its contents.

v. SCHOLLMAYER-LICHTENBERG (F.). **Einiges über die Bekämpfung des achtzähnigen Fichtenborkenkäfers** (*Ips typographus*). [Some Notes on Combating the Spruce Bark Beetle, *I. typographus*.]—*Zeitschr. angew. Ent.*, ix, no. 2, pp. 353–364, 1 fig. Berlin, June 1923.

A campaign is described against *Ips typographus*, of which a very severe outbreak occurred in the Austrian Mittelgebirge as a result of fallen trees in 1916 having been left lying on the ground. Most of the stands of spruce in the district were over 100 years old and quite ready for felling. The measures adopted were of the usual character, including the felling and barking of infested trees, the burning of the bark, and the use of trap-trunks. If old and sickly trees are carefully watched (especially in April–May and July–August) for the appearance of frass dust and for the falling of green needles, the infestation can be discovered while oviposition is in progress. Immediately it is quite completed the infested trees must be barked, and if only larvae and pupae are present it will suffice to lay the bark spread out with its inner surface upwards. If, however, adult beetles (which are very resistant to climatic action) are found, the only remedy is to burn the bark. This is, however, inconvenient in summer, whereas the danger of fire is much less in winter. The planting of pure stands of spruce should be avoided. The absolute necessity for the investigation of such outbreaks by a forest entomologist is insisted on.

NECHLEBA (—). *Ips cembrae* **als Bestandesverderber.** [*I. cembrae* as a Pest of Tree Stands.]—*Zeitschr. angew. Ent.*, ix, no. 2, pp. 365–368. Berlin, June 1923.

Larch planted in Bohemia about 100 years ago began to be attacked after the great drought of 1911 by a bark-beetle, *Ips cembrae*. The stands chiefly affected were those surrounded by spruce that had been prematurely felled owing to defoliation by the nun moth [*Liparis monacha*], the sides exposed to wind and sunshine suffering most.

This Scolytid, which is a distinctly Alpine species, has therefore established itself several hundred miles north of the Alps. The first and chief flight period occurs in June–July. Mating and oviposition take place throughout the summer and autumn, and all stages can be found in winter. The beetle therefore appears to have 1 or $1\frac{1}{2}$ generations a year in Bohemia.

SCHEIDTER (F.). *Lophyrus pallipes*, **Fall., ein bis jetzt wenig beachteter Forstschädling.** [*L. pallipes*, a Forest Pest little noticed hitherto.]—*Zeitschr. angew. Ent.*, ix, no. 2, pp. 369–389, 5 figs. Berlin, June 1923.

In 1910, *Lophyrus pallipes*, Fall., was found to be infesting a plantation of 8–10 year-old pines in a forest near Munich. The only previous record of injury by this sawfly was in Switzerland in 1894. Full details of the various stages and of the life-history are given. *L. pallipes* belongs to the group of sawflies that are gregarious and lay a batch of eggs that are not covered after deposition. In the open incubation lasts 10–14 days. If no males are present, unfertilised eggs are laid in the normal manner and give rise exclusively to males. Counts of eggs deposited gave a minimum of 42 and a maximum of 91 for one female. Usually only one larva is present in each needle. *L. pallipes*

is peculiarly a pest of young plants, and was observed only in plantations under 8 ft. high. A plantation that was severely infested about 10 years ago is now free. Pines are the only trees attacked. If control should become necessary, the collection of the larvae is the only practicable measure.

SCHEIDTER (F.). **Ueber einen bisher wenig beachten Blattroller** *Rhynchites* (*Deporaus*) *tristis*, **Fabr.** [A Leaf-roller hitherto little noticed, *R. tristis*.]—*Zeitschr. angew. Ent.*, ix, no. 2, pp. 390–394, 1 fig. Berlin, June 1923.

The leaves of sycamore, *Acer pseudoplatanus*, are sometimes rolled by *Rhynchites* (*Deporaus*) *tristis*, F., the trees affected being such as stand in shade or at least are not exposed throughout the day to sunshine. No real injury is caused by the infestation.

RUSCHKA (F.). **Die europäischen Arten der mit** *Monodontomerus*, **Westw., verwandten Gattungen. (Chalcididenstudien. IV. Teil.)** [The European Species of the Genera related to *Monodontomerus* Westw. (Chalcid Studies. Part IV.)]—*Zeitschr. angew. Ent.*, ix, no. 2, pp. 395–408, 6 figs. Berlin, June 1923.

These studies are based on material in the Natural History Museum in Vienna. A generic key and keys to the species of *Oligostenus* *Eridontomerus*, *Exopristus*, gen. n. (= *Cryptopristus*, Masi), *Cryptopristus*, Först., *Plastotorymus*, *Pseudotorymus*, *Lochites*, *Didactylocerus*, and *Dimeromicrus*, are given.

WÜLKER (G.). **Zur Biologie von** *Hylobius abietis*. [A Contribution to the Biology of *H. abietis*.]—*Zeitschr. angew. Ent.*, ix, no. 2, pp. 414–415. Berlin, June 1923.

With reference to the short and long-cycle generations of *Hylobius abietis* [*R.A.E.*, A, x, 498], further observations seem to indicate that the short-cycle occurs only in the very warm regions of the Rhine plains and Palatinate where oviposition naturally takes place early in the year.

VON WAHL (C.). **Milben in fermentierendem Tabak.** [Mites in fermenting Tobacco.]—*Zeitschr. angew. Ent.*, ix, no. 2, p. 416. Berlin, June 1923.

It is reported from tobacco factories in Baden that yearly in March—when the chief fermentation period is nearing its end—enormous numbers of mites come out of the stacks. These have been identified as *Tyroglyphus* (*Aleurobius*) *farinae*, L., by Dr. Zacher, who believes that the infestation begins in the fermenting rooms, where the high temperature accelerates increase of the mite. The workmen consider the migration of the mites to indicate that fermentation is nearly finished. No damage is done by the mites. The author did not find any in February 1922, but observed large numbers a month later. Even under the microscope no injury to the leaf-surfaces could be detected. The mites assemble near the nervures and appear to feed on the starch and sugar there. High temperatures, of 50–60° C. [122°–140° F.], have been advised against mites, but they were unaffected in this case by temperatures of 55° C. [131° F.] inside the stacks of fermenting tobacco.

FICKENDEY (E.). **Zur biologischen Schädlingsbekämpfung.** [A Contribution to the Biological Control of Pests.]—*Zeitschr. angew. Ent.*, ix, no. 2, pp. 417–418. Berlin, June 1923.

In an oil palm plantation in Sumatra where weeding was carefully practised, the palms were infested with earwigs and the red ant, *Oecophylla smaragdina*, while *Plagiolepis longipes* (granary ant) was rare. In 1920, when the palms were about 6 years old, other plants were allowed to grow among them. The earwigs have disappeared from the palms, *P. longipes* having taken their place, and also, in many cases, that of *O. smaragdina*. The bag-worms that had previously been a nuisance disappeared, chiefly owing to the action of parasites. Less injury by the rhinoceros beetle [*Oryctes rhinoceros*] has been noticed, and birds are more numerous.

ESCHERICH (K.). **Zur Biologie einiger exotischer (sudafrikanischer) Buprestiden (Coleopt.).** [A Contribution to the Biology of some exotic (South African) Buprestids.]—*Zeitschr. angew. Ent.*, ix, no. 2, p. 418. Berlin, June 1923.

Very little is known of the life-history of South African Buprestid beetles. The larva of *Juludis humeralis* lives in dying parts of the massive trunk of *Phaeoptilon spinosum*. The larvae of *Sternocera* spp. occur in various species of *Acacia*, those of *S. pulchra* being nearly always found in *A. maras*.

FRICKHINGER (H. W.). **Die Schädlingstafeln der Deutschen Gesellschaft für angewandte Entomologie.** [The Insect Pest Placards of the German Society for Applied Entomology.]—*Zeitschr. angew. Ent.*, ix, no. 2, pp. 419-425, 5 figs. Berlin, June 1923.

Each of the coloured placards here photograped represents the various stages of development of the pest concerned, and where necessary the kind of injury done is also depicted. The text is supplemented by a special leaflet issued with the sheets. Nine of the latter have been published, of which one deals with the vine moths, *Clysia ambiguella* and *Polychrosis botrana*, and the others refer to pests of man and of manufactured goods.

Amendment to the Regulations under the Destructive Insect and Pest Act, Amendment No. 19 (No. 2 of 1923).—*Canada Dept. Agric.*, 1 p. typescript, Ottawa, Ont., 31st May 1923.

Owing to the further spread of *Pyrausta nubilalis* in the United States, this Amendment has been passed to supersede that of 21st March 1922 [*R.A.E.*, A, x, 293]. The provisions of the quarantine are the same, but the area it covers includes several fresh counties in the States previously mentioned as well as some in Maine and Rhode Island.

CAESAR (L.). **The European Corn Borer—its present Distribution in Ontario and the Outlook for the Future.**—*Ontario Dept. Agric., 44th Ann. Rept. Agric. & Exptl. Union 1922*, pp. 24-26. Toronto, 1923.

The general distribution of the European corn borer [*Pyrausta nubilalis*] in Ontario has become fairly well known during the last three years, and it is present throughout the main part of the maize-growing

counties. Where maize is grown for seed, the borer is able to increase more rapidly than where the plants are used for fodder. If all stalks, stubble and other pieces of infested maize can be ploughed down and kept down, the borers must die out. There were some indications in 1922 that certain natural control factors not yet well understood may at times increase the effect of artificial measures.

SPENCER (G. J.). **Control Measures for the European Corn Borer.** —*Ontario Dept. Agric., 44th Ann. Rept. Agric. & Exptl. Union 1922*, pp. 26–29. Toronto, 1923.

The chief points for the control of the European corn borer [*Pyrausta nubilalis*] that are here indicated have already been noticed [*R.A.E.*, A, xi, 292].

ACKERMAN (A. J.). **Preliminary Report on Control of San José Scale with Lubricating Oil Emulsion.**—*U.S. Dept. Agric.*, Dept. Circ. 263, 18 pp., 6 figs. Washington, D.C., June 1923.

The distribution of the San José scale [*Aspidiotus perniciosus*, Comst.] in Arkansas is described, and the remedial measures used against it prior to 1922 are discussed. Recent experiments have shown that lubricating oil emulsion is effective against it when used as a dormant spray [*R.A.E.*, A, xi, 337].

In heavy infestations two applications are advisable, and these may be made at any time during the dormant season when the weather is fit for spraying. Under such conditions there should be no injury to the trees. Summer applications will at best only check the scale, and unless they are very carefully applied during the cool part of the day, there is always a risk of injury to the fruit and foliage.

RICHARDSON (C. H.) & SMITH (C. R.). **Studies on Contact Insecticides.**—*U.S. Dept. Agric.*, Dept. Bull. 1160, 15 pp. Washington, D.C., 29th May 1923.

A laboratory study has been made of the effect of a number of organic compounds as contact insecticides for *Aphis rumicis*, L. living on nasturtium plants (*Tropaeolum majus*).

The authors' conclusions are as follows: Pyridine, alpha picoline, and commercial pyridine containing the higher homologues of pyridine are of little value as contact insecticides. The alkaloids with the exception of nicotine, are of low toxicity. Nicotine, however, is the most toxic compound investigated (excluding pyrethron). The aliphatic amines and substituted ammonium compounds show considerable toxicity. Tetramethylammonium chloride is the most toxic, methylamine hydrochloride the least. Of the two cyclic amines, benzylamine is five times as toxic as aniline. The aliphatic aldehydes and ketones have a low order of toxicity. Benzaldehyde is moderately toxic. The aliphatic alcohols show little toxicity. Benzyl alcohol, a cyclic compound, is more toxic. Cresol U.S.P. is the most toxic of the phenols, and pyrogallol the least, while phenol and resorcinol occupy an intermediate position. The esters of cyclic compounds show some toxicity. Sulphonic acids and their salts have little effect. Picric acid and sodium salicylate show appreciable toxicity. Fish-oil soap (sodium base) is relatively ineffective. Benzene, toluene, and xylene are only slightly toxic. Aliphatic compounds containing chlorine are but

slightly toxic; benzene derivatives containing chlorine are much more so. Essential and fixed oils show some toxicity. Piperidine as the sulphate and trimethylamine as the hydrochloride when applied in dilute soap solution are more toxic than the respective free bases. Nicotine as the sulphate and nicotine base are of approximately equal toxicity. Pyridine and its homologues as found in commercial pyridine alkaloids, sodium phenol sulphonate U.S.P., aliphatic aldehydes and ketones and aliphatic alcohols of low molecular weight are relatively non-toxic to the nasturtium plant.

Neither the volatility nor the boiling point is a reliable index of the toxicity of organic compounds when used as contact insecticides. Chemical structure does not appear to be a dependable index of toxicity. Nevertheless, it is probably the best empirical guide at present available for the study of contact insecticides.

Herrick (G. W.). **The Maple Case Bearer,** *Paraclemensia acerifoliella*, **Fitch.**—*Cornell Univ. Agric. Expt. Sta.*, Bull. 417, 15 pp., 13 figs. Ithaca, N.Y., April 1923.

A more detailed description is here given of the bionomics and control of *Paraclemensia acerifoliella*, Fitch, than in a paper previously noticed [*R.A.E.*, A, x, 531]. During the past few years this Tineid moth has been remarkably free from parasites; *Apanteles ornigis*, Weed, was bred from overwintering pupae and was the only parasite reared from any stage of this case-bearer. It would probably be feasible to band the trees about the middle of August with an adhesive in order to intercept the insects in their migrations up and down the trunks.

Baerg (W. J.). **I. The Strawberry Weevil. II. A False Wireworm on Strawberry.**—*Arkansas Agric. Expt. Sta.*, Bull. 185, 33 pp., 3 pls., 7 tables, 6 figs. Fayetteville, Ark., May 1923.

The bionomics and control of *Anthonomus signatus*, Say (strawberry weevil) in Arkansas are fully dealt with. The number of eggs laid by one female averages 20–30. They hatch in 5–12 days. The larvae mature in 20–29 days, and pupation is completed in an average of 10 days. Dusting with lead arsenate and hydrated lime 1 : 4, applied at the rate of 12–15 lb. to an acre, is recommended. Two applications should be made, one as soon as about 75 per cent. of the buds have separated and weevil injury is apparent, and the second 5–7 days later. Dusting should be done in the morning as the weevils feed by day, but if the dust is applied late in the afternoon and is washed off by rain the following night, the application should be repeated immediately. A mixture of calcium arsenate and hydrated lime 1 : 4 or a mixture of lead arsenate and sulphur 1 : 5, or 15 : 85, may be used.

In the spring of 1920 *Eleodes tricostata*, Say (false wireworm) caused serious injury to newly planted strawberry beds. This beetle has not previously been recorded as attacking strawberries. The larvae feed to a slight extent on the crown, but most of the injury is done to the roots just below the crown, and the plants soon wilt and die. The life-history of this pest has already been noticed [*R.A.E.*, A, vi, 307]. Crops likely to be attacked should not be planted on newly ploughed land. In the case of garden crops, where this pest feeds in a similar manner to cutworms, poisoned bran mash has been found fairly effective.

HOUSER (J. S.). **Dusting Tall Trees by Airplane for Leaf-eating Insects.**—*Jl. Econ. Ent.*, xvi, no. 3, pp. 241–249. Geneva, N.Y., June 1923.

Further experiments in the use of aeroplanes as dusting machines against *Anisopteryx* (canker worm) and *Ceratomia catalpae* (catalpa sphinx) have confirmed the previous results [*R.A.E.*, A, x, 277] and indicate that this method will prove distinctly useful in the future on account of its extreme rapidity and because it can be employed under conditions that prohibit the use of land machines. Certain modifications of the apparatus for releasing the dust are suggested that will render its action more effective.

MARLATT (C. L.). **The When and Why of Plant Quarantines.**—*Jl. Econ. Ent.*, xvi, no. 3, pp. 251–252. Geneva, N.Y., June 1923.

An abstract only is given of this paper, which includes a review of important legislation in various countries in relation to plant pests, and also of similar legislation in the United States.

McCUBBIN (W. A.). **Factors in the Success of Domestic Quarantines.**—*Jl. Econ. Ent.*, xvi, no. 3, pp. 253–262. Geneva, N.Y., June 1923.

Quarantines are discussed from various view-points. The uselessness of quarantine laws unless backed by adequate means of enforcement is pointed out, as well as the necessity of obtaining public support and interest.

NEWELL (W.). **Tropical and sub-tropical Quarantines.**—*Jl. Econ. Ent.*, xvi, no. 3, pp. 263–266. Geneva, N.Y., June 1923.

This paper, of which a summary only is given, discusses the importance of quarantine in preventing the introduction of fresh insect pests, particularly as applied to the southern States, which have a greater variety of crops and a longer growing season. The education of the public regarding the importance of quarantines and the granting of more liberal appropriations for the work of the Federal Horticultural Board are urged.

STRONG (L. A.). **Western Views on Plant Quarantine.**—*Jl. Econ. Ent.*, xvi, no. 3, pp. 266–270. Geneva, N.Y., June 1923.

The necessity for fair and impartial enforcement of quarantine laws is emphasised. Uniform quarantine action should be adopted by States and localities having common interests, and frequent meetings of quarantine officials should take place for full discussion of mutual problems, as in the case of the Western Plant Quarantine Board.

TRIMBLE (F. W.). **An Exotic Coccid taken in the United States.**—*Jl. Econ. Ent.*, xvi, no. 3, p. 262. Geneva, N.Y., June 1923.

Nipponorthezia ardisiae, Kuw., which is a native of Japan occurring on the roots of *Ardisia japonica*, has been taken in the nests of mound-building ants in Pennsylvania. This genus has not previously been recorded from North America.

HASEMAN (L.). **Amount of Arsenic placed in Calyx Cups and Lethal Dosage for Apple Worm.**—*Jl. Econ. Ent.*, xvi, no. 3, pp. 270–275. Geneva, N.Y., June 1923.

As a result of the experiments described, it has been possible to determine the average arsenical content of the calyx cup of each apple on trees treated with different pressures and nozzles. A high pressure and coarse nozzle were found to be less effective than a lower pressure with a nozzle throwing a finer mist. It was not always found that the percentage of calyx larvae of *Cydia* (*Carpocapsa*) *pomonella* in picked apples was lowest where the average calyx content of arsenic was highest. For larvae in the third or subsequent stages, the lethal dose is approximately ·0005 gm. of powdered lead arsenate. This is practically the same as the average calyx cup content (·000521 gm.) as shown in numerous orchard spray tests. In good orchard spraying, therefore, the lower calyx cup of each blossom properly sprayed with the calyx spray will receive sufficient arsenic to poison the small larvae that may attempt to enter the fruit at that point.

SNAPP (O. I.). U.S. Bur. Ent. **Recent Developments in Plum Curculio Investigations in Georgia.**—*Jl. Econ. Ent.*, xvi, no. 3, pp. 275–283. Geneva, N.Y., June 1923.

The experimental work against *Conotrachelus nenuphar* (plum curculio) in Georgia in 1921 and 1922 [*R.A.E.*, A, xi, 265] is described. It is now known that there are two generations annually in Central Georgia, and that it is the larvae of the second generation that are particularly injurious to the best late varieties of peach.

WEIGEL (C. A.) & DOUCETTE (C. F.). **Control of the Strawberry Rootworm in Commercial Rosehouses.**—*Jl. Econ. Ent.*, xvi, no. 3, pp. 283–288. Geneva, N.Y., June 1923.

A good deal of the information regarding *Typophorus* (*Paria*) *canellus*, F., contained in this paper has been previously noticed [*R.A.E.*, A, viii, 312; x, 481]. During the summer months, fumigation should be practised during the drying-off period, to kill as many adults as possible. The surface soil should be scraped from the bed when the strawberry plants are cut back, and they should then be sprayed with lead or calcium arsenate. During September, October and November, dusting with lead arsenate and sulphur, 10:90 or 15:85, should be thorough and continuous, the foliage being kept coated with the poison. Hydrocyanic acid gas cannot be used at this time without injury to the plants, but on two or more occasions the surface water of the bed should be filmed with kerosene-nicotine-oleate to kill the adults. From about mid-February, the plants should again be kept coated with dust, and the soil in the beds should be kept covered with tobacco dust until drying-off time, with occasional applications of wood ash at monthly intervals. These will operate against larvae and pupae in the soil and newly hatched larvae that come into contact with the tobacco dust. Plants should not be kept in greenhouses longer than three years. Clean cultivation should be practised incessantly, and soil used in the beds should either be sterilised or composted for several months before being brought into the houses.

SUMMERS (J. N.). **A Japanese Tachinid Parasite of the Oriental Moth, *Cnidocampa flavescens*.**—*Jl. Econ. Ent.*, xvi, no. 3, pp. 292–293. Geneva, N.Y., June 1923.

Cnidocampa flavescens, Wlk., a native of Japan, was introduced into Boston many years ago, and has been spreading considerably during recent years. In Japan last year the Tachinid parasite, *Chaetexorista javana*, B. & B., appeared to be effectually keeping it in check, and it is considered that it would be well worth importing into America in view of the increase of its host during the last two years. The parasite hibernates in the pupal stage within the cocoon of the host, and the adults were observed emerging for about a month from mid-June, at the same time as the moths.

DEAN (G. A.). **Another Step in the Control of the Hessian Fly.**—*Jl. Econ. Ent.*, xvi, no. 3, pp. 288–291, 1 map. Geneva, N.Y., June 1923.

The usual recommendations for dealing with infestations of *Mayetiola (Phytophaga) destructor*, Say (Hessian fly) are made. Observations have now shown that the fly maintains itself in small, low, moist places; turning under the stubble in such areas, keeping them free from self-sown wheat and restricting planting until after the fly-free date will do much to destroy the flies present.

McCOLLOCH (J. W.) & SALMON (S. C.). **The Resistance of Wheat to the Hessian Fly—a Progress Report.**—*Jl. Econ. Ent.*, xvi, no. 3, pp. 293–298. Geneva, N.Y., June 1923.

A study of the different varieties of wheat from the point of view of resistance to infestation by *Mayetiola (Phytophaga) destructor*, Say, which has been in progress for several years, has produced evidence of resistance of a fairly constant nature in the field. Soft wheats have proved in general more resistant than hard varieties. The cause of this resistance has not been determined, but the indications are that it is due to physiological causes and that the presence of silica is in some way associated with it.

PARKS (T. H.). **Five Years of Hessian Fly Studies in Ohio.**—*Jl. Econ. Ent.*, xvi, no. 3, pp. 299–304. Geneva, N.Y., June 1923.

The period that has been considered safe for sowing wheat in Ohio in order to avoid infestation by Hessian fly [*Mayetiola destructor*, Say] has varied widely during five years' study. Parasitism has reached a high percentage in the case of pupae passing the summer months above-ground, but parasitism of pupae below-ground is practically limited to *Platygaster hiemalis*, Forbes, which oviposits in autumn in the eggs of the host. The parasite is absent from fields when they become infested with stragglers of the main brood of adults appearing late in September, which perpetuate the insect in fields sown near the proper seeding dates.

FROST (S. W.). **A New Apple Bud-moth in Pennsylvania.**—*Jl. Econ. Ent.*, xvi, no. 3, pp. 304–307, 1 pl. Geneva, N.Y., June 1923.

Sparganothis idaeusalis, Wlk., which has long been known as a general feeder, has recently become a serious pest of apples, and also occurs abundantly on blackberry and several other plants and weeds. The moths are on the wing in orchards in May, June, August and September.

The half-grown larvae hibernate within the dead leaves of the previous season, which they generally curl at the edges, the leaf falling to the ground. Early in the spring, the larvae seek the opening buds and feed on the developing leaves, often burrowing in the petioles or chewing the blossom. About the end of May or early June they pupate, the adults emerging 9–11 days later. Normally, there is only one complete generation in a year, but sometimes a second appears in late summer.

LEACH (B. R.), U.S. Bur. Ent., & THOMSON (J. W.). **A Control for Japanese Beetle Larvae in Golf Greens.**—*Jl. Econ. Ent.*, xvi, no. 3, pp. 312–314. Geneva, N.Y., June 1923.

The larvae of *Popillia japonica*, Newm. (Japanese beetle) constitute a serious pest in golf greens, as many as 300 being found to a square yard of turf. Sodium cyanide in solution will destroy the larvae, but also kills the grass. An emulsion that gives successful control can be obtained by adding 12·5 gm. resin-fish-oil soap to 87·5 cc. water and heating until dissolved, then placing the solution when cool in a flask or churn and adding 250 cc. carbon bisulphide. After being agitated for a few minutes the ingredients will emulsify to the consistency of thick cream; water may then be added and the emulsion remains stable. When 500 cc. of this emulsion was added to 50 U.S. gals. water and the solution applied at the rate of half a U.S. gallon to the square foot, 95 per cent. of the grubs present were killed. Lower concentrations were not sufficiently effective, but twice the strength applied at the rate of 1 U.S. gallon per square foot did not injure the grass, though concentrations of 1,500 and 2,000 cc. did some damage. When properly applied, the emulsion is a decided stimulant to the grass.

FENTON (F. A.) & TRUNDY (J. H.). **Bordeaux Mixture as a Control for Leafhoppers.**—*Jl. Econ. Ent.*, xvi, no. 3, pp. 314–317. Geneva, N.Y., June 1923.

Bordeaux mixture may be considered as a specific insecticide for at least one species of leafhopper, namely, *Empoasca mali*, and probably also for *Empoa rosae*, *Erythroneura comes* and *E. tricincta*. Recent tests with home-made 4 : 4 : 50 mixture and also with three proprietary preparations of this compound have confirmed the previous findings that the mixture is repellent to the adults and toxic to the nymphs [*R.A.E.*, A, x, 532]. The young nymphs are more susceptible to its action than older ones; the adults are not affected if forced to feed on treated leaves.

SMITH (R. I.). **Vacuum Fumigation Experiments with Brown Tail Moth and European Corn Borer Larvae under Winter Conditions.**—*Jl. Econ. Ent.*, xvi, no. 3, pp. 317–321. Geneva, N.Y., June 1923.

Attempts have been made to deal with the nests of *Nygmia phaeorrhoea* (*Euproctis chrysorrhoea*) (brown-tail moth) in mid-winter by vacuum fumigation. The larvae were killed when fumigated at 50° F. and sometimes with the temperature as low as 39° F. The larvae of *Pyrausta nubilalis* (European corn borer), taken from a storeroom at a temperature of 40° to 45° F., and fumigated at 65° to 70° F. were not killed. Borers counted as dead were frequently found to recover some days after the fumigation and even completed their development. The fumigant used was 6 oz. hydrocyanic acid to 100 cu. ft., under a

25 in. vacuum, and in the majority of cases the process lasted for two hours. When extended to from 6 to 10 hours, much better results were obtained.

It is thought, judging from these results, that imported nursery stock may be safeguarded against larvae of *N. phaeorrhoea* by this method, but that material containing larvae of *P. nubilalis* cannot be successfully treated in this way, as it would seldom arrive when the temperature is above 75° or 80° F., which is necessary for the results of fumigation to be certain.

KING (G. E.). **A Study of the Factors affecting the Outdoor Wintering of Honey Bees.**—*Jl. Econ. Ent.*, xvi, no. 3, pp. 321–323. Geneva, N.Y., June 1923.

The requirements necessary to prevent loss of bees during winter are discussed.

COOK (W. C.). **Note on a Bombyliid Parasite of the Pale Western Cutworm** (*Porosagrotis orthogonia*, **Morr.**).—*Jl. Econ. Ent.*, xvi, no. 3, p. 327. Geneva, N.Y., June 1923.

Up to 1922 the two Tachinids, *Bonnetia compta*, Fall., and *Peleteria robusta*, Wied., were the only parasites reared from *Porosagrotis orthogonia*, Morr. (pale western cutworm) in Montana. A Bombyliid, *Anthrax* sp., has now been reared from the larvae; it is apparently confined to this host, and has a life-history very similar to that of *A. lucifer*, a parasite of *Laphygma frugiperda* (southern grass worm) and the only Bombyliid previously recorded as an economic factor in cutworm control.

QUAYLE (H. J.). **Calcium Cyanide Dust as an Insecticide.**—*Jl. Econ. Ent.*, xvi, no. 3, pp. 327–328. Geneva, N.Y., June 1923.

Orange and lemon trees were successfully fumigated by blowing finely powdered calcium cyanide under tented trees, which were thus cleared of infestation with various scale insects, but when the same treatment was applied to other trees later on and subsequent rains or moist weather occurred, the scales were killed but there was distinct injury to the trees. Moisture therefore seems to be an important factor in connection with the use of this fumigant, and further tests are necessary to determine its effect. As a soil fumigant the powder is successful against woolly aphis [*Eriosoma lanigerum*, Hausm.] at a strength of 2 oz. to a square yard. Its effect on the roots of trees has not been determined, but the indications are that it will be less injurious than any form of cyanide in solution. It will also be tried against the peach root-borer [*Aegeria exitiosa*, Say] and Nematodes.

FLINT (W. P.). **Calcium Cyanide for Chinch Bug control.**—*Jl. Econ. Ent.*, xvi, no. 3, p. 328. Geneva, N.Y., June 1923.

Calcium cyanide, used in flake form and scattered over the ground in a strip 3 in. wide and so thick that the flakes were not more than ¼ in. apart, was found to kill every chinch bug [*Blissus leucopterus*] crossing it, its effect lasting from 1 to 3 hours according to conditions of temperature, moisture of the soil and humidity. A dust cyanide was

then tried, using ground spent tobacco dust as carrier. A strength of 3 or 6 per cent. gave only a fair degree of mortality; 12 per cent. killed about 95 to 98 per cent. of the bugs within 3 in. of the point of application. It is hoped to use this material extensively for field operations against chinch bugs.

CHILDS (L.). **The Drift and Development of Spray Practices in America.** —*Proc. 18th Ann. Meeting Washington State Hortic. Assoc., 1922*, pp. 12–21. Olympia, Wash., 1923.

The various methods of controlling insect pests and plant diseases in America from about 1860 to 1917 are quite briefly reviewed. The author's own tests with a spray gun are fully given. The results have been good, and this apparatus appears to waste materials less than small outfits. It has been found that 300 to 325 lb. pressure is necessary to operate the gun satisfactorily. The author is of opinion that if the application of our present understanding of sprays and spraying practices is to be more complete in the greater part of the fruit-growing sections of the country, it will have to come through the activities of trained men whose special duty it will be to know the seasonal activities of the different orchard pests and possess this knowledge in sufficient time to make it of value to growers. He also urges closer combination between chemists and entomological and pathological workers.

NEWMAN (H. E.). **Arsenate of Lead and the Leaf Roller.**—*Proc. 18th Ann. Meeting Washington State Hortic. Assoc., 1922*, pp. 21–35. Olympia, Wash., 1923.

Tests in 1922 in Spokane were confined to observations on the different methods used by various growers and the results secured against the leaf roller [*Tortrix argyrospila*] on apple trees, etc. The principal results obtained are recorded. After spraying with 4 lb. lead arsenate to 100 U.S. gals. 156 mature larvae were found in a tree, but with 8 lb. only 40 were found, 4 applications being made in both cases. Spraying with 6 lb. to 100 U.S. gals. in two applications, showed in April 12 egg-masses to a tree, and 10 in November, or a decrease of about 16 per cent.; four applications showed 261 egg-masses in April, and 213 in November, or a decrease of about 18 per cent.; and three applications, 1,130 egg-masses in April, and 645 in November, or a decrease of about 43 per cent. On small trees the same mixture showed a decrease of about 18 per cent., and on high trees an increase of about 44 per cent. occurred, emphasising the fact that all spraying must be thorough and that the entire tree should be covered.

The principal reasons for the dissatisfaction that has been felt when lead arsenate has been used are chiefly based on superficial evidence, that the blossoms have been killed, a high percentage of the fruit injured, the foliage badly chewed, and there appear to be as many adults during the flying season as there had been the year before. The author considers the following are the reasons why the majority of growers do not get control with lead arsenate sprays. The spray may have been too weak, the use of lime-sulphur may have reduced the efficiency of the pink spray, possibly a clover cover crop may have interfered with results, and the trees may have been too tall or too thick to permit thorough work, or the whole of the spraying may not have been thoroughly carried out. It is not practicable to treat

severe infestations with lead arsenate alone, and they must be dealt with by oil sprays, but when careful work is done lead arsenate will hold the leaf roller in control to the extent of preventing its increase.

WHITCOMB (W. D.). U.S. Bur. Ent. **Appearance, Habits and Seasonal History of the Codling Moth.**—*Proc. 18th Ann. Meeting Washington State Hortic. Assoc., 1922,* pp. 35–39. Olympia, Wash., 1923.

The life-history of the codling moth [*Cydia pomonella*] is recorded in order to enable growers to identify it in their orchards, and notes on the seasonal history of both generations are also given.

NEWCOMER (E. J.). U.S. Bur. Ent. **Codling Moth Control in Washington.**—*Proc. 18th Ann. Meeting Washington State Hortic. Assoc., 1922,* pp. 39–44. Olympia, Wash., 1923.

The rather serious outbreak of the codling moth [*Cydia pomonella*] that occurred in 1921 was mainly due to the weather conditions, which are described and compared with those in 1918. The measures recommended are scraping the bark and the various sprays for the different broods, and these are given in detail. A summary is given of four years' work at Yakima together with the results obtained in 1922. In years of slight infestation, spraying is sufficient, but banding and thinning help when the larvae are numerous.

WICKERSHAM (C. P.). **Codling Moth Control.**—*Proc. 18th Ann. Meeting Washington State Hortic. Assoc., 1922,* pp. 47–48. Olympia, Wash., 1923.

The author gives an account of his own experience to prove that the codling moth [*Cydia pomonella*] can be effectively controlled by two thorough sprays against the first brood of larvae. In 1920 he used the two sprays 18–21 days apart, in 1921, 15 days, and in 1922, 10–12 days. The calyx spray is applied at a pressure of 250–275 lb. 6–8 days after the dusk temperature reaches 60° F., and 10–12 days later all the apples are covered again. No spraying was done after 18th June during these three years. In 1922 less than $\frac{1}{8}$ per cent. of infested fallen apples was recorded.

MELANDER (A. L.). **Red Spiders.**—*Proc. 18th Ann. Meeting Washington State Hortic. Assoc., 1922,* pp. 77–79. Olympia, Wash., 1923.

MELANDER (A. L.). **Handling Red Spider Menace.**—*Better Fruit,* xvii, no. 12, pp. 5–6, 1 fig. Portland, Oreg., June 1923.

The three species of red spider that are abundant in Washington are *Tetranychus telarius, Bryobia praetiosa* and *Paratetranychus pilosus.* The occurrence of these mites, the damage they cause, their bionomics and the remedies for them are dealt with generally.

MELANDER (A. L.). **Conclusions drawn from Spraying Experiences on San José Scale.**—*Proc. 18th Ann. Meeting Washington State Hortic. Assoc., 1922,* pp. 79–81. Olympia, Wash., 1923.

MELANDER (A. L.). **Tolerance of San José Scale to Sprays.**—*Washington Agric. Expt. Sta.,* Bull. 174, 52 pp., 1 chart, 1 plate, 14 tables. Pullman, Wash., February 1923.

The second of these papers contains a detailed account of spraying experiments against San José scale [*Aspidiotus perniciosus*] carried out

from 1908 to 1922, together with the conclusions that have been drawn. The latter only are given in the first paper.

There is much variation among different scales in susceptibility, particularly to sprays based on sulphur. The amount of tolerance is locally variable. A temperature of 30° F. destroys more scales than the usual spraying does, and in a mild winter as many as 98 per cent. of young scales may survive. Good emulsions based on crude oil are quicker and more dependable sprays for San José scale than those based on sulphur, such as lime-sulphur or barium-sulphur. Poor results are to be expected if the trees are wet at the time of application. A poorly emulsified oil or one with insufficient insecticidal value is less effective than a low-grade lime-sulphur. Well emulsified oils, used as a late dormant spray, following a normal winter should be depended on as safe to the trees. Autumn spraying with oil is not recommended. Emulsions based on wood distillation products instead of crude petroleum oil have little killing value.

Lime-sulphur and soda-sulphur have a greater insecticidal value than barium-sulphur. Factory-made lime-sulphur is as satisfactory as home-made and is more dependable in composition. The exact concentration of lime-sulphur is less important than thoroughness in application. The addition of lime, lye, nicotine or a casein spreader to lime-sulphur does not materially alter its effectiveness. There is no experimental evidence to show that dry lime-sulphur is superior to liquid.

The most reliable determination of the value of an insecticide is microscopic examination of actually sprayed scales about one month after application. The best time for spraying is when the buds begin to swell. When foliage begins to appear, dormant sprays may cause scorching, and this is especially true with soda-sulphur and crude oil emulsions. Absence of living scales following a severe winter is not necessarily due to successful spraying, and the fact that one treatment has been found satisfactory in one locality is no assurance that it will be universally effective.

Newcomer (E. J.). U.S. Bur. Ent. **A new Oil Spray for the San José Scale.**—*Proc. 18th Ann. Meeting Washington State Hortic. Assoc. 1922*, pp. 83–87. Olympia, Wash., 1923.

The preparation is described of an oil emulsion for the San José scale [*Aspidiotus perniciosus*] [*R.A.E.*, A, xi, 303, 337, 409].

The history of this oil emulsion since it was first made in 1906 is reviewed. Its advantages are that it costs about one-half as much as lime-sulphur and considerably less than fuel oil emulsions. It is more easily handled than lime-sulphur, as only 6 gals. are required for a tank instead of about 20. It is not so disagreeable to use. It covers the tree very thoroughly and kills the scale. It is safer than most fuel oil sprays for the reasons that this engine oil is a much more uniform product than fuel oils, and there is much less oil present in the spray. There are a few disadvantages. It must be kept from freezing. It is probably not safe to use in the autumn or winter on account of the danger of very cold weather following, but may be used safely in the spring. It will not mix with even a very small amount of lime-sulphur.

In the discussion that followed the author said that 1 per cent. will kill red spiders and even ½ per cent. will kill most of them, and there is a possibility that it will kill the wintering eggs. So far it has not been used against leaf-roller [*Tortrix argyrospila*], but a greater strength than 2 per cent. may be necessary for this moth.

Trujillo Peluffo (A.). **Nueva cochinilla para el país.** [A Scale new to Uruguay.]—*Uruguay : Minist. Industrias, Defensa Agric. Bol. Mensual*, iv, no. 3–4, pp. 39–40, 1 fig. Montevideo, March–April 1923.

The occurrence of *Epidiaspis piricola*, Del Guer., has been noted near Montevideo. This Coccid has not been recorded before from Uruguay and is not widely distributed there.

The Uganda Customs (Amalgamation) Ordinance, 1918.—*Uganda Official Gaz.*, 15th May 1923, p. 294. Entebbe, 1923.

Two notices under this Ordinance prohibit (1) the importation of seeds, plants or parts of plants of *Hibiscus esculentus*, *H. sabdariffa*, *H. cannabinus*, *Althaea rosea*, *Thespesia populnea* and *Abutilon* spp. from all countries where *Platyedra gossypiella*, Saund. (pink bollworm), is known to occur ; (2) the importation of sugar-cane plants or parts of such from all countries, except under a written permit previously obtained from the Director of Agriculture.

Departmental Activities : Entomology.—*Jl. Dept. Agric. Union South Africa*, vi, no. 6, p. 479. Pretoria, June 1923.

Ceratitis capitata is now breeding on the second crop of the fruit of the white milkweed, *Sideroxylon inerme*. Numerous fruit-flies have also been observed feeding on figs that had been eaten open by birds, though *C. capitata* was only present in small numbers, the majority consisting of *Pterandrus rosa*. Blackberries were infested with *P. rubivorus*. *Dacus brevistylus* (lesser pumpkin-fly) was reared in large numbers from the fruits of *Coccinea palmata*, a wild cucurbitaceous plant. Three adults of *Munromyia nudiseta* (olive-seed fruit-fly) are still alive after having been under observation for over 8 months. Various flies have been reared from the fruits of *Solanum sodomeum*, but none were Trypetids.

Larvae of *Phytometra acuta* did considerable damage to the foliage of citrus trees in eastern Transvaal, having migrated from a cover-crop of cowpeas.

A small parcel ($2\frac{1}{2}$ lb.) of selected cotton seed from Egypt was found infested with living larvae of the pink bollworm [*Platyedra gossypiella*], although it had been certified that it had been fumigated by heat and also by carbon bisulphide at the rate of 1 lb. to 32 cu. ft. for 24 hours.

Van Der Merwe (C. P.). **The Destruction of Vegetable Ivory Buttons. The Ravages of the "Button Beetle" (*Coccotrypes dactyliperda*, F.) and Suggestions for its Control.**—*Dept. Agric. Union South Africa*, 4 pp. Pretoria, 1923.

Coccotrypes dactyliperda, F., deposits eggs that hatch in about 5 days. Five days after the burrow has been started, as many as 14 eggs have been found inside, and after 8 days, 26 eggs and larvae were present. The larvae cannot develop without the mother. The duration of the various stages can only be determined approximately. The pupal stage lasts about 5–7 days in summer. The interval from the entrance of the parent to the finding of the first adult derived from her eggs was 28–30 days in summer and up to 69 in winter. Seeds of various plants were attacked when put in a jar containing infested material ; they included those of *Phoenix reclinata*, *Hyphaene crinata*

(native vegetable ivory), *Elaeis guineensis* (oil palm), *Seaforthia, Hyphorbe* and *Cocos plumosa*. Apparently the insects cannot breed in maize or beans. Vegetable ivory is the product of certain palms such as *Phytelephas macrocarpa, Coelococcus carolinensis* and probably others. No complaints about this beetle have been received from parts of the Union other than Durban, and it is probably more destructive there owing to the warmer climate favouring rapid development.

Only the less costly remedies are recommended. Care should be taken in the disposal of infested buttons, which should be burned. As the beetles do not make their way into material wrapped in paper, clothing carefully packed in it can be made secure against attack. The use of date-seeds in stores as traps is not recommended unless they are regularly attended to. Holes may be bored in the seeds, which are then strung on a thread and hung up in places where they will be frequently under observation. After examination they may be dropped into boiling water for a few minutes and used again. All infested stock should be got rid of as quickly as possible. Buttons of metal, bone, horn, vulcanite, etc., are not liable to attack. Infested buttons on garments may be dipped in boiling water for a few minutes. Loose buttons seldom appear to be attacked.

Delassus (—). **Un Invasion formidable de Chenilles en Algérie.**—*Rev. agric. Afr. Nord*, xxi, nos. 203 & 204, pp. 392–396 & 405–410, 7 figs. Algiers, 22nd & 29th June 1923.

An usual abundance of caterpillars appeared on cultivated plants from 15th May to 5th June 1923 in Algeria. The species concerned were *Vanessa cardui* attacking artichokes and tomatos, and the Sphingid, *Deilephila lineata* and various Noctuids including *Agrotis* (*Triphaena*) *pronuba* attacking vines. All of these species, though of general occurrence in Algeria, are usually confined to their favourite food-plants, in most cases weeds, thistles, etc.

Various remedies were tried, insecticides containing arsenicals proving to be of most value ; consequently special permission has been obtained from the Government to use this poison in the present infestation.

There is urgent need of some method of enforcing the application of necessary remedial measures similar to the laws existing for the control of locusts.

Bouclier-Maurin (H.). **Les Destructeurs des Grains emmagasinés.**—*Rev. agric. Afr. Nord*, xxi, no. 204, pp. 412–414. Algiers, 29th June 1923.

Among the chief pests of stored grain in Algeria are the weevils *Calandra granaria* and *C. oryzae*, and the Tineids, *Alucita* sp. and *Tinea granella*. A brief account is given of the seasonal history of these insects, and the usual measures against them are recommended. These include disturbance and ventilation of the grain, fumigation with carbon bisulphide and the application of heat.

Kirkpatrick (T. W.). **Preliminary Notes on two minor Pests of the Egyptian Cotton Crop** (*Creontiades pallidus*, **Ramb., and** *Nezara viridula*, **L.**).—*Egypt: Minist. Agric., Tech. & Sci. Service*, Bull. 33, 15 pp. Cairo, 1923.

The Pentatomid, *Nezara viridula*, L., and the Capsid, *Creontiades pallidus*, Ramb., are to some extent responsible for damage to cotton

that has hitherto been attributed to *Oxycarenus hyalinipennis*, Costa. Very little is known about the life-history of *C. pallidus*. In 1922 it was common on cotton from the middle of May till the middle of August, during which time it was breeding. During September and the greater part of October not a single individual could be found, but at the end of October it reappeared in small numbers. It is stated to be found in maize cobs, unripe heads of millet and sometimes on berseem [*Trifolium alexandrinum*]. It is not known whether it breeds on any other plant besides cotton. The eggs are inserted into the tissues of the plant, and are most frequently laid in the groove between two divisions of the carpel wall of a green boll and sometimes in the gland at the base of the mid-rib on the lower surface of a leaf. In a single observation, the period of incubation occupied 3 days in July. There are almost certainly five nymphal stages. The total life-cycle is probably completed in about 3 weeks. All stages feed on the buds or young bolls, the adults fly readily, and the immature bugs often drop out of the epicalyx when approached. Buds or bolls that have harboured the insects are usually conspicuous from the brilliant yellow excrement with which they are covered. It is possible that this bug aestivates during the hot weather, which would account for its disappearance from the cotton in August and September. It is to some extent attracted to light.

N. viridula appears to be a very general feeder, and its food-plants are recorded. The eggs are laid in masses of 40. The author has not observed them on cotton, but on the leaves of a wild grass and on the leaves of maize. The life-history in Egypt has not been worked out, and there is no information on the length of the life-cycle or on the number of generations a year. On cotton the bugs feed on the green bolls, and sometimes on the leaves and stems. Carnivorous habits are occasionally developed, and according to Adair, the bugs sometimes destroy the eggs of *Prodenia litura*, F.

C. pallidus feeds on buds as readily as on bolls, and a considerable amount of shedding is the result. Experiments on bud-shedding are described. Of seven with which the Capsid was enclosed six were shed shortly after flowering, and one almost immediately before flowering. The control buds all produced sound healthy bolls. Of three medium-sized buds open to attack, two were shed as buds, while three control ones developed normally. The nature of the damage to green bolls is described. Experiments have shown that the larger the boll the greater the intensity of the attack necessary to cause shedding. When older bolls are attacked, they are not shed, but a varying amount of damage is done according to the degree of infestation, and data as to the amount of damage that may be done are given. Both these bugs pierce the green bolls in order to suck the seeds, and tests show that if one or two seeds are attacked, the germination of the remainder is not affected.

The total loss to the Egyptian cotton crop by the production of bolls that dry up prematurely is very considerable. As these two bugs were found to cause premature splitting and the production of dead lint, experiments were carried out to ascertain how much of this damage is due to bollworms, *Earias* [*insulana*] and *Platyedra* (*Gelechia*) *gossypiella*] and how much to other causes. The results show that bollworms are generally responsible for most of the lint that fails to fuzz out and is very weak, which fetches only a quarter of the price of of sound cotton, and for nearly all the bolls that are a total loss, as

the percentage of bolls attacked by bollworms is very much higher in these classes than it is in the bolls containing sound lint. There are indications, however, that over 10 per cent. of the damaged cotton is the work of plant bugs.

N. viridula can be controlled to a large extent by hand-picking, but this would be more difficult in the case of *C. pallidus*. Clean cultivation and the extermination of weeds growing on canal banks and at the sides of fields should be practised.

CAVARA (F.). **Danneggiamenti delle Termiti a piante diverse.** [Damage by Termites to various Plants.]—*Rend. Accad. Sci. Fisiche e Matemat.*, ser. 3a, xxviii, no. 9–12, pp. 190–194, 1 plate. Naples, September–December 1922.

A brief bibliographical review prefaces observations of termite attack on a living plant of *Chrysanthemum indicum* in Catania and on *Musa ensete* and *Lonicera tatarica* in Naples.

PAILLOT (A.). **Les Maladies bactériennes des Insectes.**—*Ann. des Epiphyties*, viii, pt. 4, pp. 95–291, 8 plates, 89 figs. Paris, 1922. [Received 7th July 1923.]

The study of the micro-organisms parasitic upon insects was taken up some years ago, but knowledge of the subject was then in such a state of confusion that very little success was obtained. The study has now been resumed on a more rational and solid basis. The technique of these experiments is explained, and the systematic position of certain entomophytous micro-organisms is discussed. The bacterial parasites of various well-known insects are described and include many new species. An attempt is made to classify them, and their morphology and structure are considered. The method of infection of insects with bacteria, and the possibility of artificial dissemination have also been studied. The question of insect immunity is entered into, and the theories regarding phagocytosis and humoral reactions are considered.

One of the conclusions reached is that the bacterial parasites of a given insect vary in form, to a greater or less degree, until they would sometimes appear to belong to a different species, thus rendering their classification very difficult; this is particularly the case with cocco-bacilli. The virulence of the micro-organism does not increase regularly with each successive passage through the same host, but is influenced by various factors that are but little understood and vary greatly with different individuals. Contamination by the mouth cannot be effected, even in the case of the most virulent species, either in the laboratory or in nature; the creation of artificial epidemics is therefore a technical impossibility, according to present knowledge. Immunity can be produced in insects by methods similar to those employed in the case of vertebrates; it is arrived at much more rapidly but is less lasting and seems to be caused by physico-chemical modifications of the composition of the blood and of the bacterial substance.

MARIE (P.). **Liste d'un certain nombre d'Insectes trouvés dans les gésiers de jeunes *Corvus frugilegus* (Linné).**—*Bull. Soc. ent. France*, 1923, no. 9, pp. 135–136. Paris, 1923.

A list of insects, including several of economic importance, found in the contents of the alimentary canal of young rooks is given.

BERNÈS (J.). **Sauterelles et Criquets.**—*Progrès agric. & vitic.*, lxxx, no. 27, pp. 33–34. Montpellier, 8th July 1923.

Various species of locusts cause serious damage to numerous crops in the Var district, and the need for the application of energetic remedial measures is pointed out. The more satisfactory mechanical and chemical measures usually recommended are given in detail.

SPEYER (E. R.). **Researches upon the Larch Chermes** (*Cnaphalodes strobilobius*, **Kalt.**), **and their Bearing upon the Evolution of the Chermesinae in General.**—*Philosoph. Trans. R. Soc. London*, Series B, ccxii, no. B. 395, pp. 111–146, 2 plates, 14 figs. London, 28th June 1923.

A short introduction includes the chief characteristics of the biology of CHERMESINAE as compared with PHYLLOXERINAE, with a brief reference to "parallel series" and an "alternation of form" in successive generations, the latter having been brought to light for the first time. A list of European genera and species with definite and intermediate food-plants is given in tabular form.

A general outline is given of all the main life-cycles of *Chermes (Cnaphalodes) strobilobius*, Kalt., on spruce and larch, figures of the first stage larvae and the adults of all the generations being included. The sexual forms are figured for the first time. A summary shows that successive generations alternate in respect of the presence and absence of wings, low and high production, and leaf and stem feeding. This alternation ceases at the sexupara generation, and is started again by the succeeding sexual generation.

The wingless progrediens type (a dimorphism of the winged sexupara), found on the larch, is regarded as a form that has lost its wings by selective adaptation and is therefore not homologous with the truly wingless generations, the fundatrix and sistens.

A section is devoted to experimental work upon the parthenogenetic generations on the larch. The winged sexupara is shown to increase in the first generation arising from the sistens from year to year at the expense of the potentially winged progrediens type. This occurs irrespective of environmental conditions.

The sequence of generations from the gallicola migrans is as follows: gallicola—sistens—progrediens (and sexupara)—sistens. This conforms with a true alternation of form. Starting now from the last mentioned sistens generation, in the second year the sequence is sistens—progrediens (and sexupara)—sistens 90 per cent. and progrediens 10 per cent., the latter giving a final generation of sistentes. The alternation has here broken down, but has righted itself in the succeeding generation. In the third year a larger percentage of progredientes appears out of turn in the cycle, independently of environmental conditions. Through field observations it is seen that this breaking-down in the alternation of form finally results in a sequence of progrediens generations, the sistens type being eliminated by the progrediens type. It is concluded that the sistens and progrediens types therefore do not constitute a true dimorphism. Intermediate forms appear to show a tendency toward a restoration of an alternation of form. A diagram of the approximate scheme of the life-cycle follows.

The theoretical considerations upon the evolution of CHERMESINAE comprise a comparative biology of the European species, of which the main biological characteristics are given in each case with diagrams of

the life-cycles. From the information collected, it is concluded that the life-cycles of CHERMESINAE arose from a simple alternating parthenogenetic cycle on a spruce, sexuality having been lost very early in evolution. By migration, this alternating cycle was transferred to a second food-plant, selective conditions in a second environment bringing about morphological differences in the individual generations. By selection, dimorphic types arose, and finally the food-plant was regained by a second migration. Here the sexual forms at present in existence were evolved as new types having few characteristics in common with the other generations of the cycle. With the return to sexuality a recapitulation of the original cycle has linked up the two separate cycles on the definitive and intermediate food-plants. The known European species of CHERMESINAE can be arranged in a practically complete evolutionist series: while some have ceased their biological evolution at very early times, others have progressed further; a few are still in a state of instability.

Two appendices give the figures actually obtained in experiments and the methods employed in obtaining them.

MILES (H. W.). **Control of the Apple Blossom Weevil.**—Reprint from *Jl. Pomology*, 8 pp. [London] January 1923. [Received 9th July 1923.]

The life-history of *Anthonomus pomorum*, L., and the usual remedial measures against it have already been noticed [*R.A.E.*, A, x, 607]. A list is given of various sprays that have been tested with remarks as to their efficiency. For ease in preparing the unstable paraffin emulsion in the field, potash soft soap in liquid form (50 per cent. soap) was found satisfactory. In March 1922 a plantation containing 55 apple trees and a few damson and plum trees was sprayed with 20 gals. of a spray made up of 2 gals. paraffin, about 3 lb. potash liquid soft soap and 18 gals. water. After two hours dead weevils were found in the crevices; those only partly wetted by the spray were still alive but died within 2 days. To economise in spray fluid it would be advantageous to use a knapsack spraying machine directing the spray only on spots likely to harbour the weevil. Great difficulty was experienced in keeping the spray in emulsion.

Attempts were made to determine the damage done to the trees by paraffin. Four trees were put into cold storage of 34° F. in December 1921, and after one month's treatment they were exposed in the open air for about a week, they were then subjected to the warmer temperature of a greenhouse until growth commenced and the bud scales were seen to be lifting. This was the dormant spray period, and the paraffin emulsion was applied on 16th January, and a fortnight later, when the buds were showing green at the tips, the second tree was sprayed. No ill-effects being noted, field trials were made, and no damage resulted.

HASE (A.). **Ein Schädling an Pfeffer- und Krauseminze.** [A Pest of Peppermint and Curl Mint].—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, iii, no. 7, p. 51. Berlin, 1st July 1923.

Mint is being largely used in Germany as a substitute for tea. Larvae of *Pyrausta aurata*, Sc., attacked the young leaves and tender stems in the summer of 1922. The only measure advocated is the collection or crushing of the caterpillars.

La **campaña contra la langosta.** [The Campaign against Locusts.]—*Rev. Inst. Agric. Catalán S. Isidro,* lxxii, no. 5, pp. 93–94. Barcelona, May 1923.

In dealing with the threatened outbreak of locusts in Aragon [R.A.E., A, xi, 351] the spraying of fields and waste lands with solutions of sodium arsenate and lime soon proved to be the best and cheapest method. From 20th April to 6th May 1923 about 2,500 acres were treated and the outbreak was completely mastered.

MIYAKÉ (K.). **Prevention of the Injurious Insects and Diseases of Apple Tree.**—*Hokkaido Agric. Expt. Sta.,* Bull. 27, 77 pp., 1 plate, 1 chart, 5 figs. Sapporo, Japan, 1922. [Received 10th July 1923.]

This bulletin is in Japanese, the insects mentioned being *Lepidosaphes ulmi,* L. (*Mytilaspis pomorum,* Bch.), *Eriosoma lanigerum,* Haus., *Aphis pomi,* DeG., *Chlorita flavescens,* F., *Tortrix* (*Cacoecia*) *rosaceana,* Harris, *C. ingentana,* Christ., *C. sinapina,* Butl., *Eucosma* (*Tmetocera*) *ocellana,* F., *Coleophora nigricella,* Steph., *C. malivorella,* Riley, *Argyresthia conjugella,* Zell., *Hyponomeuta malinellus,* Zell., *Illiberis sinensis,* Wk., *Hemerophila* (*Simaethis*) *pariana,* Clerck, *Phigalia sinuosaria,* Leech, *Ennomos alniaria,* L., *Aporia crataegi adherbal,* Fruhs., *Malacosoma neustria testacea,* Motsch., *Porthetria* (*Lymantria*) *dispar,* L., *Spilarctia infernalis,* Butl., *S. imparilis,* Butl., *Hylotoma mali,* Mats., *Agelastica alni coerulea,* Motsch., *Carposina saskii,* Mats., and *Rhynchites heros,* Roel.

HUTSON (J. C.). **Notes on Termites attacking Tea in Ceylon.**—*Trop. Agric.,* lx, no. 5, pp. 291–298, 2 plates; also Dept. Agric. Leaflet 24. Peradeniya, May 1923.

This paper contains a more detailed account, chiefly as regards remedial measures, of *Calotermes militaris, C. dilatatus* and *C. greeni* on tea in Ceylon than one already noticed [*R.A.E.,* A, xi, 315].

GADD (C. H.) & JARDINE (N. K.). **The Control of Shot-hole Borer in Tea by the Use of General Manures. Preliminary Report.**—*Trop. Agric.,* lx, no. 5, pp. 299–304, 3 tables. Peradeniya, May 1923.

The investigations here described were undertaken to ascertain the effect of a complete manure at varying quantities to an acre on attacks by shot-hole borer [*Xyleborus fornicatus*] and the extent to which manuring promotes healing of borer galleries. Final conclusions cannot be formulated until all the examinations are completed, but the following are offered tentatively. The application of a complete manurial mixture at the rate of 350 lb. or 550 lb. to an acre at the end of the first year resulted in an increase in the rate of healing of the galleries, and a corresponding diminution in the number of open galleries. The proportion of empty galleries and the average number of inmates of the occupied galleries were not definitely affected by the application of the manures. An application of 550 lb. of general mixture to an acre gave no better results than one of 350lb. The application of manures has little effect on *X. fornicatus* itself, but it increases the vigour of the bushes. Consequently where borer attack is judged by the damage to the bushes it would appear that a reduction in the borer attack follows the application of manures.

Myers (J. G.) & Atkinson (E.). **The Relation of Birds to Agriculture in New Zealand. II. The Birds of the Forest.**—*N.Z. Jl. Agric.*, xxvi, no. 5, pp. 299–306. Wellington, 21st May 1923.

The activities of birds in forests are discussed under three headings. They are the chief agents in keeping forest insect pests in check, they act as pollinators of the flowers of forest trees, and they are distributors of the seeds. In New Zealand they are extremely important factors in all three respects, but in the great pine forests of the north of the Old and New Worlds practically their sole service comes under the first heading. In New Zealand there are 36 kinds of indigenous birds that are predominantly forest dwellers, of which no fewer than 28 subsist either wholly or in part on insects.

Morrison (H.) & Morrison (E.). U.S. Bur. Ent. **The Scale Insects of the Subfamilies Monophlebinae and Margarodinae treated by Maskell.**—*Proc. U.S. Nat. Mus.*, lxii, art. 17, no. 2463, 47 pp., 3 pls., 19 figs. Washington, D.C., 1923.

Amongst the Coccids dealt with the following are described from Australia: Monophlebinae, *Monophlebulus comperei*, sp. n., and *M. subterraneus*, sp. n., both on roots of *Eucalyptus*, *Nodulicoccus*, gen. n., for *Drosicha levis*, Mask., *Auloicerya*, gen. n., for *Palaeococcus australis*, Mask., and *A. acaciae*, sp. n., on *Acacia hueglii*; and Margarodinae, *Platycoelostoma*, gen. n., for *Coelostomidia compressa*, Mask. Keys are given to the species of *Monophlebulus* and *Callipappus*

Riquelme Inda (J.). **Plagas de insectos y otros artrópodos observadas en la República Mexicana el año de 1914.** [Insect and other Arthropod Pests observed in the Republic of Mexico in 1914.]—*Rev. Agric.*, iii, no. 1–9 (October 1918–January 1919), pp. 162–173. San Jacinto, D.F., 1921. [Received 10th July 1923.]

A list is given of insect pests under their popular and scientific names, with their food-plants and the remedial measures suggested for them.

Quarantine on account of Japanese Beetle. Notice of Quarantine No. 48, with Regulations (2nd Revision).—*U.S. Dept. Agric., Fed. Hortic. Bd.*, 6 pp., 1 map. Washington, D.C., 9th April 1923.

As a result of the increasing spread of the Japanese beetle [*Popillia japonica*, Newm.], it has again been found necessary to extend the areas under restriction in Pennsylvania and New Jersey. This revised quarantine [*cf. R.A.E.*, A, x, 595] became effective 15th April 1923.

Quarantine on account of the Pink Bollworm. Regulations (2nd Revision) under Quarantine No. 52.—*U.S. Dept. Agric., Fed. Hortic. Bd.*, 11 pp. Washington, D.C., 19th May 1923.

This revises the regulated areas quarantined on account of the pink bollworm [*Platyedra gossypiella*, Saund.] and the rules regarding interstate movement of the regulated articles. It came into force on 1st June 1923 and supersedes the revised rules and regulations issued under Notice of Quarantine No. 52 [*R.A.E.*, A, x, 594].

Pests collected from Imported Plants and Plant Products from January 1, 1922, to December 31, 1922, inclusive.—*U.S. Dept. Agric., Fed. Hortic. Bd., Ann. Letter Inform.*, no. 36, 38 pp. Washington, D.C., 1923.

A list is given of pests intercepted from 1st January 1922 to 31st December 1922 on plants imported into the United States from various other countries. These include 123 recognised species of scale-insects and many others that could not be identified beyond the genus. The same applies to other important groups of insects. Particulars are given of the insects found in the soil surrounding the plants.

Among those found in fruit are: *Ceratitis capitata* (Mediterranean fruit fly) in apples from Algeria and in mangos, avocados and coffee berries from Hawaii; *Dacus* (*Bactrocera*) *cucurbitae* (melon fly) in cucumbers and tomatos from Hawaii; *Toxotrypana curvicauda* (papaya fruit fly) in mangos from Jamaica; *Anastrepha ludens* (Mexican fruit fly) in limes, oranges and mangos from Mexico and sapodilla from Nicaragua; *A. fraterculus* (West Indian fruit fly) in Cuban plums and mangos from Cuba and mangos from Jamaica; larvae probably of *A. fraterculus* in pejibayes fruit from Costa Rica and mangos from Jamaica; unrecognised species of *Ceratitis* in quince from Argentina; and larvae of *Metamasius sericeus* (sugar-cane borer) in pejibayes fruit from Costa Rica. Though formerly collected in sugar-cane and stems of banana leaves, this appears to be the first record of *M. sericeus* in fruit.

Other miscellaneous pests include: *Acronycta rumicis* (sorrel cutworm), and *Aporia crataegi* on fruit and rose stocks, and *Nygmia phaeorrhoea* (*Euproctis chrysorrhoea*) (brown-tail moth) on fruit stock from France; *Emphytus cinctus* on manetti stocks from France, England, Holland and Ireland; *Cydia* (*Laspeyresia*) *molesta* (oriental fruit moth) on pear trees from Japan; *C.* (*L.*) *pomonella* on apple trees from New Zealand; *Malacosoma neustria* (European lackey moth) on plants from France; *Pyrausta nubilalis* (European corn borer) in Hungarian broom corn and in samples of broom corn posted in France; *Platyedra* (*Pectinophora*) *gossypiella* (pink bollworm) in cotton seed from Brazil, in cotton and cotton waste used as packing from St. Kitts, in seed from Egypt, Porto Rico and the British West Indies and cotton bolls from Hawaii; *Merodon equestris* (narcissus fly) in narcissus bulbs from France and Holland; *Eumerus strigatus* (lesser bulb fly), and larvae of *Corymbites aeneus* in narcissus bulbs from Holland; *Rhizoglyphus hyacinthi* in a variety of bulbs from practically all countries exporting to the United States; *Anuraphis tulipae* on iris rhizomes from England, Holland and France; *Micromyzus tulipaella* on iris from England; *Forficula auricularia* on iris from France and miscellaneous bulbs from Holland; *Aleurocanthus woglumi* (citrus black fly) on foliage of plants from Cuba, Jamaica, and Bahama Islands; *Aleurothrixus howardi* on citrus foliage from Cuba and on banana from Porto Rico; *Aleurodicus cardini* on guava leaves from Cuba; *Aleuroparadoxus punctatus* on *Lithraea caustica* from Chile; pupae of *Aleurothrixus floccosus* on citrus foliage from Porto Rico; *Heilipus lauri* (avocado weevil) in avocado seed from Mexico; *Cryptorrhynchus* (*Sternochetus*) *mangiferae* (mango weevil) in mango seed from Hawaii; *Reticulitermes speratus* in logs of *Paulownia* from Japan; *Nasutitermes* sp., in fibre plants from Colombia; *Cylas formicarius* (sweet potato weevil) in tubers from China, Cuba, Bahama Islands and Haiti; *Euscepes batatae* (West Indian

sweet potato weevil) from Brazil, Trinidad and Barbados; *Omphisa anastomosalis* (sweet potato stem borer) in sweet potatoes from China; and larvae, presumably of ***Trypopremnon latithorax***, in potatoes from Mexican ports.

Lovett (A. L.). **Vegetable Insects.**—*17th Bienn. Rept. Oregon State Bd. Hortic., 1923,* pp. 102–104. Salem, Oreg., 1923.

This paper on general remedies against various vegetable pests is practically identical with one already noticed [*R.A.E.*, A, xi, 357].

Lovett (A. L.). **Insect Pests of Truck and Garden Crops.**—*17th Bienn. Rept. Oregon State Bd. Hortic., 1923,* pp. 122–141, 11 figs. Salem, Oreg., 1923.

A general account is given of the insect pests that infest various vegetable and garden crops together with remedial measures for them. Notes are also given on poison and contact insecticides.

Quaintance (A. L.). U.S. Bur. Ent. **The Peach Borer: How to Prevent or Lessen its Ravages. The Paradichlorobenzene Treatment.**—*17th Bienn. Rept. Oregon State Bd. Hortic., 1923,* pp. 142–151, 13 figs. Salem, Oreg., 1923.

This paper on the bionomics and control of the peach borer [*Aegeria exitiosa*] is practically identical with one already noticed [*R.A.E.*, A, x, 186].

Lovett (A. L.). **The Cherry Fruit-fly.**—*17th Bienn. Rept. Oregon State Bd. Hortic., 1923,* pp. 166–168, 3 figs. Salem, Oreg., 1923.

Lovett (A. L.). **How to Curb Cherry Fruit-fly.**—*Better Fruit*, xviii, no. 1, pp. 7 & 26, 1 fig. Portland, Oreg., July 1923.

The bionomics of the cherry fruit-fly [*Rhagoletis cingulata*, Lw.] and the injury it causes have already been noticed [*R.A.E.*, A, x, 394]. The following poison bait is recommended: ½ lb. lead arsenate, 2 U.S. qts. molasses or syrup (never honey) and 10 U.S. gals. water; and this is sufficient to spray about 50 trees. The first application should be made when the adults appear, the second 10 days later and the third about a week after the second. Two applications may suffice, if well timed, and in the absence of rain. From 1 pint to 1 quart of solution to a tree is sufficient. Heavy applications should be avoided. The solution should be applied to the upper surface of the lower leaves and the foliage of adjacent trees and shrubs should also be sprayed. For early varieties the last spray may be omitted. The amount of injured cherries may be reduced by about 85 per cent. by intelligent use of this bait.

Lovett (A. L.). **The Loganberry Crown-borer** (*Bembecia marginata*, **Harris**).—*17th Bienn. Rept. Oregon State Bd. Hortic., 1923,* pp. 169–170. Salem, Oreg., 1923.

The bulk of this information on the bionomics and control of ***Pennisetia (Bembecia) marginata*** has already been noticed [*R.A.E.*, A, ix, 166].

CHITTENDEN (F. H.). U.S. Bur. Ent. **The Asparagus Beetles and their Control.**—*17th Bienn. Rept. Oregon State Bd. Hortic., 1923*, pp. 183–190, 9 figs. Salem, Oreg., 1923.

Most of this information on the bionomics and control of *Crioceris asparagi*, L., and *C. duodecimpunctata*, L., has already been noticed [*R.A.E.*, A, vi, 214].

ALDRICH (J. M.). **The Grape Phylloxera.**—*17th Bienn. Rept. Oregon State Bd. Hortic., 1923*, pp. 191–192, 1 fig. Salem, Oreg., 1923.

Phylloxera vastatrix attacks both American and European grapes. The foliage of American grapes is mainly affected. It is a native insect, and a brief account of its history is given. In vineyards of the European varieties only the root form occurs, and the spread is therefore comparatively slow, being estimated at about three rows of vines a year. In the eastern States the winged form appears to be an annual occurrence, but in California it is not thought to occur so often.

Owing to its subterranean habits no satisfactory remedy for *Phylloxera* has been found. All vines found to be infested, together with all other vines for 3 rows in all directions, should be renewed. The ground should then be kept free of vegetation for a year. The practice of grafting European vines on American stocks has hardly been followed at all in districts where *Phylloxera* does not yet occur, and considerable trouble is to be anticipated from this neglect. The method of propagation by cuttings should be given up and only properly grafted vines planted.

DAVIDSON (W. M.) & NOUGARET (R. L.). **How the Presence of Phylloxera is indicated.**—*17th Bienn. Rept. Oregon State Bd. Hortic., 1923*, pp. 193–195, 2 figs. Salem, Oreg., 1923.

The presence of *Phylloxera* in a vineyard is indicated by areas distinguished by stunting and yellowing of the trees; these are not very noticeable the first year but afterwards increase in size, until the vines in their centres die. The area is normally circular, but may become irregular in shape owing to the presence of running water or to wind transportation of larvae in summer and autumn. The extent of injury to the root can generally be estimated from external appearance, and the degree of infestation in a vineyard can be computed from the number of such areas, their size, and the condition of the vines composing them.

The development of the nymph and of those individuals that are destined to become winged is explained. The influences that tend to the production of gallicole or radicicole forms and the development of the gallicolae-radicicolae in various European countries and in different parts of America are discussed.

SHELTON (B. B.). **The European Earwig in Oregon.**—*17th Bienn. Rept. Oregon State Bd. Hortic., 1923*, pp. 199–205, 2 figs. Salem, Oreg., 1923.

A brief account is given of the life-history and habits of the European earwig [*Forficula auricularia*] in Oregon, together with its distribution in North America. The leaves, fruit and flowers of a variety of plants are eaten, and nearly all garden vegetables are subject to attack.

Among ornamental plants the dahlia is the most infested. Natural enemies in America are few. Toads are almost unknown in places infested with earwigs in Oregon, and whether they could be introduced is a matter for experiment. A poison bran mixture is recommended consisting of 12 oz. sodium fluoride, 2 U.S. qts. molasses, 12 lb. wheat bran and 6 U.S. qts. water. The sodium fluoride should be dissolved in the water, and the molasses stirred in and all added to the bran. The mixture should not be wet enough to drip without being pressed. The bait should be scattered on the ground just before dark during the latter part of May or early June or even in late summer. It should only be scattered thinly over lawns, and these should not be watered for 2 or 3 days afterwards. A general application of poison bran baits should be followed up by baits applied to trees, walls and other objects several times during the summer, and the following mixture, which will not dry for several days, is recommended: 1 oz. sodium fluoride, 5 oz. molasses, 5 oz. glycerine, 5 oz. water and about 1 lb. oat husks. The sodium fluoride should be mixed in the water first, the molasses and glycerine added and mixed with enough oat husks to make a wet mash. Precautions should be taken as regards this poison in the case of children and poultry.

DOANE (R. W.). **Syrphid Larvae as Pests.**—*Science*, lvii, no. 1487 p. 741. Garrison, N.Y., 29th June 1923.

The large numbers of larvae of Syrphid flies, chiefly *Lasiophthicus pyrastri*, that were feeding on the Aphid, *Myzus* (*Rhopalosiphum*) *persicae*, caused a considerable financial loss to spinach growers in California in the spring of 1923. The flies were so numerous that it was impossible to clean the spinach for tinning, and this had to be abandoned. Early planting is the best remedy, since spinach that is planted early in autumn and ready for tinning in March is not infested by the Aphids to any extent, nor are Syrphid flies found.

LEONARD (L. T.). **Mealy-bugs on the Roots and Nodules of Legumes growing in the Field.**—*Science*, lvii, no. 1484, pp. 671–672. Garrison, N.Y., 8th June 1923.

Mealy-bugs infest the underground parts of annual leguminous plants in the United States, chiefly the nodules, except in the case of red clover, the tap-root of which is preferred.

Pseudococcus maritimus, Ehrh., is widely distributed on the Atlantic and Pacific coasts, and infests the roots and tops of a large variety of plants.

Pseudococcus trifolii, Forbes, has been noted on red clover from many States, and on white clover from Illinois, and *P. citrophilus*, Claussen, on sweet clover from California. Judging from superficial appearances there is no difference between the infested and uninfested plants, but the possibility of mealy-bugs becoming a menace to the nitrogen-fixing functions of some of the common economic leguminous plants suggests that a wider and more exhaustive investigation should be made.

FELT (E. P.). **35th Report of the State Entomologist, 1921.**—*New York State Mus. Bull.*, no. 247–248, 129 pp., 3 figs., 2 graphs. Albany, N.Y., 25th June 1923.

The history of *Pyrausta nubilalis*, Hb. (European corn borer) in America is reviewed and a list is given of the infested counties, cities

and towns in New York State, where its spread has been comparatively limited during the past season. During 1919 a marked difference was noticed between the development of the borer in New York and Massachusetts. Though there is no definite evidence that the borer only breeds in maize in New York, infestation of weeds and grasses was always found to be close to infested maize fields, the inference being that the borers had wandered from the latter. All varieties of maize are attacked, the injury appearing most severe in the small and medium varieties. The early fields suffered more than those planted later. In Massachusetts the pest occurs on about 170 different species or varieties of herbaceous plants, including a number commonly grown in gardens, but this infestation of plants other than maize is generally due to the work of the second brood, which apparently does not develop under normal conditions in New York. The usual remedial measures are outlined; they should, however, be adapted to suit local conditions. In single brooded areas the pest may be considerably reduced by concentrating efforts of control on the early maize.

The work in connection with *Cydia* (*Carpocapsa*) *pomonella*, L., has been continued, and details are given with regard to temperature and oviposition. *Heliothis* (*Chloridea*) *obsoleta*, F. (corn ear worm) was exceptionally injurious and widely distributed during 1921 in New York State. In certain sections of the State, where this pest is sufficiently abundant from year to year, autumn ploughing for the destruction of the hibernating insects may be recommended, but as a rule, the systematic application of the usual remedial measures are unpractical in New York as serious damage by this pest is unusual. The larvae should, however, be watched for, and where they occur at the end of June or beginning of July, material injury may be expected, in which case the damage may be decreased by dusting the silk of the developing ears with a mixture of 50 per cent. powdered lead arsenate and 50 per cent. finely ground sulphur. This should be applied as soon as the silk appears and followed by one or two more treatments before the maize is ready to pick. *Byturus unicolor*, Say (raspberry beetle) proved very injurious locally; and though owing to the habits of the beetles, spraying is not considered very satisfactory, it should be possible to produce a fair crop even in badly infested raspberry patches by using lead arsenate. Two or three applications should be made at three-day intervals, and the sprays must be driven into the unfolding leaves.

Sitodiplosis (*Thecodiplosis*) *mosellana*, Gehn. (wheat midge) has been unusually abundant in recent years. A general account is given of the infestation in the various counties of New York. The time of sowing, method of cultivation and contiguity of infested fields appear to have little influence upon this pest, and while there is some range in varietal infestation, even this is not great. The harder, stiffer bearded wheats seem to be relatively immune. At least in restricted localities even rotation of crops is not likely to have a material effect upon infestation by *S. mosellana*. Injury is most severe when climatic conditions cause the grain to remain soft and ripen slowly. In order to produce a fairly good crop in spite of midge infestation, it is important to prepare the soil to promote a vigorous growth. A summary of the occurrences of *S. mosellana* on rye during 1919 indicates a more general and serious infestation than had hitherto been associated with that crop in America.

Mayetiola (*Phytophaga*) *destructor,* Say (Hessian fly) is usually found in small numbers in most grain fields. It depends more than many other species on favourable climatic conditions at the time the grain is developing, and probably to a less extent upon the relative abundance of natural checks, especially parasites. A comparison of data on infestation from 1917 to 1921 indicates a progressive increase in the numbers of the pest up to 1920 followed by a material decrease in 1921.

Harmolita tritici, Fitch (wheat joint worm) and *H. vaginicola,* Doane (wheat sheath worm) are present in most wheat fields and occasionally become very abundant, in some instances causing almost total destruction of the crop. Rotation of crops is particularly recommended against these Chalcids in sections where they are expected to become abundant. In badly infested areas wheat should not be sown close to fields under grain the previous year as infestation may arise as a result of migration. Both species pass the winter in the stubble, so that burning over the fields in the autumn and early spring is advisable.

Tribolium confusum, Duv. (confused flour beetle) is one of the commonest pests of stored cereals and of foods prepared from them. Experiments conducted on the life-history suggest periods of inactivity between generations, making estimates of the number of generations based on the time required to complete the transformations inaccurate unless allowance is made for this period. In the present experiments the life-cycle was completed in from 50 to 90 days, and only in one instance was a possible second generation observed and then only five months after the appearance of the first generation larvae. Heat is considered the most satisfactory method of killing this beetle, for which a temperature of 120° F. is necessary.

Other cereal pests recorded during the year included *Hadena fractilinea,* Grote (lined corn borer), tunnelling in the stalks of young maize; *Achatodes zeae,* Harr. (spindle worm), infesting maize, *Dahlia* and elder; and *Pedecia albivitta,* Wlk. (leather jackets), found in large numbers in an oatfield.

Apples were attacked by *Nodonota puncticollis,* Say (rose leaf beetle), which was common on roses, blackberry, raspberry and red clover, and *Amctastegia glabrata,* Fall. (dock false worm), found boring cylindrical holes into the sides of the fruit.

Pests of forests and shade trees included a species of *Bucculatrix* (not *B. ulmella,* Zell.) from European elm; *Aegeria* (*Sesia*) *acerni,* Clem., from soft maple; *Ennomos subsignarius,* Hb. (snow-white linden moth) from basswood, ash, beech, soft maple and to a less extent from hard maple, though after these trees were stripped, the caterpillars ate everything except cherry; *Oberea tripunctata,* Swed. (dogwood twig borer) from azalea; *Phylloxera caryaecaulis,* Fitch (hickory gall aphis), unusually abundant; *Xylotrechus colonus,* F., infesting logs and dead trees of black oak, white oak, hickory, chestnut, ash and elm; *Neoclytus erythrocephalus,* F., breeding commonly in sickly and dying elm and hickory, but also occurring in other trees; *Graphisurus fasciatus,* DeG., boring in beech and hickory, but apparently limited to weakened or dying trees; *Tremex columba,* L., common in diseased or dying portions of various trees, particularly elms and maples, also occurring in hickory logs; *Xyleborus celsus,* Eich., infesting hickory and oak; *Magdalis olyra,* Hrbst. (hickory snout beetle), breeding commonly in dead or dying hickory trees; and *Chramesus hicoriae,* Lec. (hickory twig borer), numerous in hickory twigs.

Other miscellaneous insects recorded include *Phytomyza ilicicola*, Lw. (American holly-leaf miner); *Leucopomyia pulvinariae*, Mall., reared from *Pulvinaria vitis*, L. (cottony maple scale) on *Crataegus*; *Thecodiplosis ananassi*, Riley (cypress twig gall); and *Eriococcus azaleae*, Comst. (azalea bark scale).

HENDEL (F.). **Blattminierende Fliegen (Musciden).** [Leaf-mining Flies.]—*Wiener ent. Ztg.*, xxxix, pp. 65–72. Vienna, 25th October 1922.

The leaf-mining flies noticed in this paper include *Phytomyza heringiana*, sp. n., infesting apple.

LAUBERT (R.). **Eine wenig beachtete häufige Missbildung des Holunders.** [A little noticed common Deformation of Elder.]—*Gartenwelt*, xxvi, pp. 235–236, 1 fig., 1922. (Abstract in *Zeitschr. Pflanzenkr. & Gallenk.*, xxxiii, no. 3–4, p. 130. Stuttgart, 1923.)

Leaf deformation in *Sambucus nigra* caused by the mite, *Epitrimerus trilobus*, Nal., is discussed and illustrated.

BÖRNER (C.). **Gibt es eine oder zwei Reblausarten amerikanischer Herkunft?** [Are there one or two Species of *Phylloxera* of American Origin?]—*Weinbau & Kellerwirtsch.*, i, pp. 245–249, 1922. (Abstract in *Zeitschr. Pflanzenkr. & Gallenk.*, xxxiii, no. 3–4, pp. 136–137. Stuttgart, 1923.)

The author considers that two species of *Phylloxera* have been introduced into Europe from America [*cf. R.A.E.*, A, xi, 342]. *P. vastatrix*, Planch. (formerly called *P. pervastatrix* by the author) has *Vitis labrusca* as its principal food-plant, and it also occurs on the European vine, *V. vinifera*. It causes swellings both on the young roots and on older ones, and is found in North and South Europe, but does not produce the leaf-gall form in the North. *P. vitifolii*, Fitch, has *V. riparia* as its principal food-plant. It lives only on one-year-old roots, on which it produces swellings. It occurs only in South Europe, where it produces leaf-galls. The wingless root-infesting forms and the nymphs of both species show some slight morphological differences.

LANGE (—). **Ein bisher unbekannter Pflanzenschulschädling.** [A previously unknown Pest of Plant Nurseries.]—*Forstl. Wochenschr. Silva*, 1921, p. 239. (Abstract in *Zeitschr. Pflanzenkr. & Gallenk.*, xxxiii, no. 3–4, p. 140. Stuttgart, 1923.)

It is recorded that 70 per cent. of newly planted one-year-old pines in a nursery were destroyed by the larvae of *Thereva annulata*, a fly that has not previously been known as a pest.

LINNANIEMI (W. M.) & HUKKINEN (Y.). **Zur Biologie und Verbreitung der *Dasychira selenitica*, Esp., mit besonderer Berücksichtigung ihres Massenauftretens in Finnland.** [On the Biology and Distribution of *D. selenitica*, with particular Regard to Outbreaks of it in Finland.]—*Acta Soc. Fauna et Flora Fennica*, xlviii, no. 7, pp. 1–27, 11 figs., 1921. (Abstract in *Zeitschr. Pflanzenkr. & Gallenk.*, xxxiii, no. 3–4, p. 149. Stuttgart, 1923.)

Outbreaks of *Dasychira selenitica*, Esp., occur in several parts of Finland. There are numerous food-plants of this moth. Horses,

but not cattle, refuse clover infested with the caterpillars. Its numbers are kept in check by a Tachinid, *Winthemia amoena*, Mg., and a polyhedral disease.

Wichmann (H. E.). **Ueber** *Anthonomus varians*, **Payk.**—*Centralbl. f. d. ges. Forstwesen*, xlviii, pp. 10–13. Vienna, 1922. (Abstract in *Zeitschr. Pflanzenkr. & Gallenk.*, xxxiii, no. 3–4, p. 156. Stuttgart, 1923.)

The active white larvae of *Anthonomus varians*, Payk., feed on the pollen of white pine [*Pinus strobus*] and of *P. montana*. The infestation is recognised by the thread-like excreta of a sulphur-yellow colour. The young weevils begin feeding on the needles a few days after emergence. Even when *A. varians* is abundant, no real injury seems to be done to the trees.

Ext (W.). **Zur Biologie und Bekämpfung der Rübenblattwanze** *Zosmenus capitatus*, **Wolff.** [A Contribution to the Biology and Control of the Beet Leaf Bug, *Z. capitatus*.]—*Arb. Biol. Reichsanst. Land- u. Forstw.*, xii, no. 1, pp. 1–30, 12 figs. Berlin, 1923.

Of recent years the beet leaf bug, *Zosmenus* (*Piesma*) *capitatus*, Wolff, has been a serious pest of sugar and fodder beet in parts of Germany [*R.A.E.*, A, x, 501, 504]. The injury begins with the feeding on young beet plants of hibernated bugs, especially females. The punctures usually occur on the lower surfaces of the leaves, which curl downwards. If the infestation is severe, the plants wither and die. The later the attack, the less the injury. From mid-April to the end of May the bugs leave the uncultivated areas that serve as winter quarters and return to them about October, so that few bugs are seen in the beet-fields when the crop is being harvested. The worst infestations have been noted where fields adjoin areas suitable for hibernation. Oviposition usually occurs on the lower surface of the young beet leaves and lasts from about the end of May to the end of July. The hibernated adults then die. Incubation lasts 2–3 weeks. The developmental periods of the four larval stages are very variable, the total larval stage averaging 45½ days. The time required from the deposition of the egg to the emergence of the adult was 62 days in the laboratory. It is probably less, 4–6 weeks, in the field.

As all stages occur together in the field throughout the summer, any insecticide, to be effective, must act on them all. Measures against the bug include the elimination of grass edges or other uncultivated ground in contact with beet-fields. Beet must be sown as late as possible, not before mid-May. The edges of the fields should be cleared in late autumn. In some cases potato foliage and other débris may be placed as winter traps. Trap-crops may be used in spring, but care must be taken to plough them under at the proper time, and to harrow and roll afterwards, as ploughing under alone will not suffice. The best results with insecticides were obtained with a home-made petroleum-soap emulsion containing 20 gals. petroleum, 12½ lb. hard soap and 10 gals. soft water. This stock solution is diluted with 15 parts water. If only hard water is available for making the stock, a little soda may be added as to soften it. Young plants should not be treated before 8 a.m. or after 5 p.m. A cloudy sky and a misty day are best. The bug has no natural enemies of any value. In one instance a minute parasite was seen, possibly a Trombidiid mite, *Allotrombium fuliginosum*, Herm.

BLUNCK (H.) & GÖRNITZ (K.). **Lebensgeschichte und Bekämpfung der Rübenaaskäfer.** [Life-history and Control of the Beet Silphid Beetles.]—*Arb. Biol. Reichsanst. Land- u. Forstw.*, xii, no. 1, pp. 31–49. Berlin, 1923.

For some years sugar-beet in the coastal districts of Pomerania has suffered severe injury from Silphid beetles, the average loss of crop being about 25 per cent. The chief species concerned are *Blitophaga opaca*, L., and *B. undata*, Mull. The hibernated adults of *B. opaca* migrate in warm, sunny weather in May and early June to the young beet plants and begin feeding, usually at the leaf-edges. Under conditions favourable to them, 8–10 young plants may be destroyed in a day. The beetles were frequently seen on goose-foot, and in captivity they fed on *Atriplex hortensis* and spinach. According to Kemner [*R.A.E.*, A, vi, 92] they are more active at night, but this was not confirmed. The eggs are deposited in moderately damp earth. Incubation lasts from 5–6 days at 19° C. [66·2° F.] to 9 days at 16° C. [60·8° F.]. The newly-hatched larvae soon leave the ground to find food. *Amarantus* is one of their preferred food-plants, and in captivity they accepted various Cruciferae. The earthen pupal case is found at a depth of $\frac{2}{5}$–2 in. beneath the surface. The total development from egg to adult averages five weeks. Sparrows feed on the larvae, and in the first half of June about 20 per cent. of the hibernated adults were parasitised by an unidentified Tachinid.

The progeny of one pair of these beetles can defoliate over 100 sq. ft. of cultivated ground. The adults are directly responsible for only 5 per cent. of this. Owing to the fact that loose, light soil in protected situations is preferred for oviposition, such places are the first to show signs of injury, and they constitute foci of infestation.

In Germany *B. opaca* and *B. undata* are the species really to be feared as beet pests, *Silpha obscura* being dangerous under certain conditions only. The character of the places chosen for oviposition, the susceptibility of the eggs to drought, and the fragility of the pupae provide an opportunity for control by intensive hoeing, preferably by hand. Fields should be kept free from wild food-plants such as Chenopodiaceae. The introduction of poultry into the fields has given encouraging results, but this method is only applicable where the infestation is moderate or limited in area. No satisfactory baits have been discovered.

HASE (A.). **Weitere Beiträge zur Frage der biologischen Bekämpfung von Schadinsekten, insbesondere über die Bekämpfung der Mehlmotten mit Hilfe von Schlupfwespen.** [Further Contributions to the Question of the Biological Control of Insect Pests, particularly that of the Meal Moths with Hymenopterous Parasites.]—*Arb. Biol. Reichsanst. Forst- u. Landw.*, xii, no. 2, pp. 51–78. Berlin, 1923.

Following previous investigations on these subjects [*R.A.E.*, A, x, 566], the Braconid, *Habrobracon brevicornis*, Wesm., and larvae of the meal moth, *Ephestia kühniella*, were used in these experiments, which are described in detail. Of 500 larvae liberated at the beginning of the test, 129 were recovered, and of these 54 per cent. had been attacked by the 100 parasites employed. This percentage applies when three female Braconids are present to a square metre of surface or 11 females to a cubic metre of space. If 100 per cent. of the pest

is to be destroyed, 5 female parasites to a square metre or 20 to a cubic metre, must be present. For a warehouse of 1,000 cubic metres space (about 35,000 cu. ft.) 20,000 females of *H. brevicornis* would be required. This use of the Braconid is therefore not practicable, and even if it were, the fact that to obtain a complete result a considerable time (9 days in the tests made) would be needed, renders the biological method inferior to fumigation, because it would be too costly to close down a mill for so long a period. *H. brevicornis* nevertheless remains a useful auxiliary, and it is desirable that efforts should be made to introduce and establish it in all flour mills from a central breeding station, from which supplies could be obtained as required.

WATT (A. S.). **On the Ecology of British Beechwoods with special Reference to their Regeneration.**—*Jl. Ecology*, xi, no 1, pp. 1-48, 2 figs. London, 24th May 1923.

The agents responsible for injury to the roots and leaves of seedling beeches are chiefly Lepidopterous larvae, including those of *Agrotis* (*Triphaena*) *pronuba*, *Hepialus lupulinus*, *Hybernia defoliaria*, *Cheimatobia brumata*, *Pandemis corylana*, and *Tortrix* sp. Coleopterous pests are *Agriotes* sp., *Strophosomus coryli*, and *Rhynchaenus* (*Orchestes*) *fagi*. Other serious insect pests are *Typhlocyba douglasi*, which attacks beech trees of all ages, and *Phyllaphis fagi*.

LEES (A H.). **Cabbage Root Fly.**—*Gardeners' Chron.*, lxxiv, no. 1907, p. 25. London, 14th July 1923.

The larva of the cabbage root fly, *Phorbia brassicae*, is responsible for much damage in hot or dry seasons. It also attacks many other cruciferous plants including cauliflowers, turnips, swedes and radishes. It commonly appears about the end of April and in May, and there are usually three generations in the year. The first especially damages early cauliflowers and, to a rather less extent, early varieties of broccoli. Brussels sprouts are attacked only to a comparatively small extent. The second and third generations are not so serious to the gardener although damage may be done to savoys and spring cabbage.

The usual remedies for this well-known pest are given.

KNAPP (A. W.). **Insect Pests in the Cacao Store.**—16 pp., 6 figs. Bournville Works, Pubn. Dept. [1923.] Price 6d.

The information contained in this paper has been noticed elsewhere [*R.A.E.*, A, x, 21].

MORSTATT (H.). **Einführung in die Pflanzenpathologie.** [An Introduction to Plant Pathology.]—8vo., viii + 159 pp., 4 figs. Berlin, Gebrüder Borntraeger, 1923.

This elementary textbook is intended for agriculturists, foresters, horticulturists and biologists. Both applied botany and applied entomology are dealt with. The work is intended to survey the whole field of plant pathology. The symptoms of disease and its investigation form the first section, while the second treats of pathological plant anatomy and physiology. The third section deals with vegetable, animal and inanimate causal agents, the last-named including weather,

soil and the effect of chemicals. The concluding chapter reviews the methods employed in plant protection work. The text is supplemented by footnote references to reliable literature, and an index completes the volume.

Los daños causados a la riqueza olivarera de España por el " *Dacus oleae* " **Meig.** [The Losses to Spain's Olive Wealth through *D. oleae*.]—*Bol. Agric. Técnica y Econ.*, xv, no. 174, pp. 574–577. Madrid, 30th June 1923.

The annual loss due to the infestation of olives in Spain by *Dacus oleae*, Mg., is estimated at 8 per cent. of the average value of the crop.

GHESQUIÈRE (J.). **Note au sujet des moyens de lutte à employer contre la chenille des capsules,** *Heliothis obsoleta* **(bollworm) et les capsules épineuses,** *Earias biplaga, E. insulana* **(spiny bollworm).** —*Bull. agric. Congo belge*, xiv, no. 1, pp. 119–124, 2 figs. Brussels, March 1923.

This paper has previously been noticed from another source [*R.A.E.*, A, xi, 15].

HEGH (E.). **Les Termites. Annexes à la première partie (Cinq premiers chapitres).**—*Bull. agric. Congo belge*, xiv, no. 1, pp. 159–177, 9 figs. Brussels, March 1923.

The various uses to which the natives of Africa put termites and the mounds they make are described in this instalment of this work, which has been noticed separately as a whole [*R.A.E.*, A, x, 570].

GHESQUIÈRE (J.). **Le " Ver rose " au Congo Belge. La répartition géographique et son importance économique en Afrique.**—*Bull. agric. Congo belge*, xiv, no. 1, pp. 178–188, 8 figs. Brussels March 1923.

In the course of a study of the cotton pests in various parts of the Belgian Congo, *Platyedra gossypiella*, Saund. (pink bollworm) was not found, in spite of its presence having been suspected in those regions. A list is given of other Lepidoptera that may easily be confused with it. The geographical distribution of *P. gossypiella*, and of other imported pests, is illustrated in a map, showing its occurrence in territory adjoining the Belgian Congo; and a defence zone has been created, about 60 miles long, on the north-east frontier. In this zone not only the cultivation of cotton is prohibited, but also the transport of cotton seed, and raw or ginned cotton. The usual remedial measures against the moth are enumerated, and the necessity for establishing disinfecting stations on the chief roads leading to the colony is pointed out.

KING (H. H.). **Entomological Section.**—*Rept. Sci. Res. Committee, Sudan Govt., 1922*, p. 8. Khartoum [n.d.]. [Received 18th July 1923.]

Investigations have been made into the value of *Abutilon* spp. as a trap for *Earias insulana* (spiny bollworm) on cotton, and of the relative importance of the various sources from which the cotton crop becomes infested with *Platyedra gossypiella* (pink bollworm).

Continued investigations have been made into the bionomics of and remedial measures for *Heliothrips indicus* (cotton thrips). The breeding of *Attacus ricini* (Eri silkworm) has been carried on on an experimental scale.

JARVIS (H.). **Fruit-fly Investigations.**—*Queensland Agric. Jl.*, xix, pt. 5, pp. 369–371. Brisbane, May 1923.

Dacus ferrugineus (*tryoni*) is distributed chiefly by mechanical means such as the importation of infested fruit. The advisability of subjecting such fruit to cold storage is pointed out. Packing sheds may be a great source of fresh infestation and should be carefully cleared of all rubbish, the stored fruit being shifted at least once a week.

Only one individual was caught in traps placed in an uncleared strip of bushland between two infested orchards, so that it is concluded that either this fruit-fly does not readily travel under such circumstances or else does so high up in the air. *Lonchaea splendida* (tomato fly) was abundant on this strip of land, and numbers of it were captured in each trap.

Other injurious insects are a Buprestid, *Diadoxus* sp., associated with the dying of the leaders of ornamental cypress trees, its native food-plant being black cypress pine (*Callitris calcarata*); and *Plutella maculipennis* (*cruciferarum*) (cabbage moth), which has been causing serious injury to cabbages.

Cotton Pests in North Queensland.—*Queensland Agric. Jl.*, xviii, pt. 6, p. 414; xix, pt. 5, p. 409. Brisbane, December 1922 and May 1923.

Injury to cotton, the cause of which could not be identified, has been reported from the Darling Downs district, similar conditions being subsequently recorded also from a North Queensland plantation. In the latter case the injury was found to be due to a large reddish-black ant, which attacks both the seeds and the young shoots. The damage is done at night.

MYERS (J. G.). **A Contribution to the Study of New Zealand Leaf-hoppers and Plant-hoppers (Cicadellidae and Fulgoroidea).**—*Trans. New Zealand Inst.*, liv, pp. 407–429, 47 figs. Wellington, 30th April 1923.

The families that comprise the division Auchenorrhyncha of the Rhynchota have received very little attention. This paper is an attempt to bring up to date the knowledge concerning the above families as a basis for future taxonomic and biological work.

MISRA (C. S.). **The Cultivation of Lac in the Plains of India (*Tachardia lacca*, Kerr).**—*Agric. Res. Inst., Pusa*, Bull. 142, 83 pp., 23 plates, 14 figs. Calcutta, 1923.

This bulletin replaces an earlier one issued in 1912, some of the information given having been noticed from other sources [*R.A.E.*, A, vi, 513; ix, 80; x, 181]. In addition to the parasites already recorded, *Oedematopoda venusta*, Meyr., has been bred from colonies of *Tachardia lacca*, and *O. cypris*, Meyr., from colonies of *T. albizziae*;

an Anthocorid, *Triphleps* sp., has been observed to attack the gravid females in south India; and much damage to brood-lac has been found to be due to various Hymenopterous parasites, including *Tachardiaephagus thoracicus*, Gir.

KHARE (J. L.). **Ber** (*Zizyphus jujuba*) **Fruit and its Fly Pest.**—*Agric. Res. Inst., Pusa*, Bull. 143, 16 pp., 2 charts. Calcutta, 1923.

The only insects of any importance attacking the fruit of *Zizyphus jujuba* in India are the larvae of the small moth, *Meridarchis scyrodes*, Meyr., and the fruit-fly, *Carpomyia vesuviana*, Costa. The latter is the more common of the two. It attacks the ripening fruit, the infestation varying almost directly according to the order of sweetness of the variety. The life-history has not been completely worked out, but there appear to be two or three broods from November to February of the following year. The emergence of the fly is extremely irregular, the pupal stage lasting anything from 19 to 301 days or more. The flies of the last brood begin to emerge during March and again from June till November. The eggs are laid about 5 mm. beneath the rind, one or two in each hole. The larvae eat their way through the pulp to the seed, but cut a small hole to the exterior of the fruit, apparently for purposes of respiration. When they are full grown this exterior opening is enlarged, and through it the larva descends to the soil for pupation. It cannot bury itself more than a couple of inches beneath the soil surface, but will travel deep into cracks in the earth. It is certain that the fly may aestivate as a pupa during April, May and June when the temperature is very high; outside temperature and laboratory temperature do not make any difference to this period. High temperature and consequently extreme dryness is unfavourable to the pupae in the soil. The effect of weather conditions is shown in a table from which it is concluded that the greater the emergence in September and October, the greater will be the attack of the fly at the beginning of the fruiting season, this depending on the humidity and temperature.

In the Nagpur district there are thousands of trees spread over a very large area, and they bear fruit very profusely, so that any but cultural remedial measures would be impracticable. The soil under the trees should be disturbed at the end of the fruiting season to prevent cracking, and the surface burnt over to destroy the pupae.

The Braconids, *Bracon fletcheri* and *Biosteres carpomyiae* have been recorded as parasites of *C. vesuviana* by Silvestri [*R.A.E.*, A, iv, 514], and notes on their life-history are here given. They do not appear to decrease the infestation in spite of the fact that they are found in fairly large numbers.

FULMEK (L.). **Rupsenbestrijding bij Deli-Tabak I.** [Measures against Caterpillar Pests of Tobacco in Deli I.]—*Meded. Deli Proefst.*, 2nd Ser., no. 27, 15 pp. Medan, 1923.

Part of the information given here has been already noticed from a previous paper [*R.A.E.*, A, xi, 40]. In recent years spraying with lead arsenate has superseded the old method of protecting tobacco seed-beds with cotton coverings. A number of experiments show that instead of 2 per cent. lead arsenate as hitherto used, 1 per cent. is quite sufficient. The spray should contain 0·3 per cent. of soap to ensure uniform wetting. Spraying must be done every three or four days or whenever the white spray deposit has been washed off.

The jet must be fine and not too powerful, applied at about 19 inches from the plants. The latter must be dry, and the work must not be done too early in the morning or the solution will take long to dry.

In the case of many caterpillars, such as *Phytometra* (*Plusia*), *Prodenia*, etc., it is important that the lower surfaces of the leaves should be protected. Dipping the seedlings entirely except the roots in 1·4 per cent. lead arsenate and 0·3 per cent. soft soap before planting out is a useful method of achieving this result.

EGGERS (H.). **Neue indomalayische Borkenkäfer (Ipidae).** [New Indo-Malayan Bark-beetles.]—*Zool. Meded. R. Mus. Nat. Hist.*, vii, no. 3-4, pp. 129-220, 2 figs. Leyden, 1923.

Descriptions are given of 127 new species of Scolytids from the islands extending from Ceylon to Formosa and the Philippines. These include over 70 new species of *Xyleborus* and 14 belonging to a new genus, *Dendrugus*, which may prove synonymous with *Thamnurgides*, Hopk. Quite a number of species from the Indian Archipelago are also known from Equatorial Africa. The author repeats his opinion that the coffee berry borer from Sumatra is identical with *Stephanoderes coffeae*, Hgd., from East Africa, and not with *S. hampei*, Ferr. [*R.A.E.*, A, x, 572].

JACK (H. W.). **Rice in Malaya.**—*Malayan Agric. Jl.*, xi, nos. 5 & 6, pp. 103-119 & 139-161, 1 map. Kuala Lumpur, May & June 1923.

The insects recorded as injurious to rice in Malaya, which are dealt with in the second part of this paper, include the bug, *Podops coarctata*, which sucks the sap from the base of the plants, so weakening them that no grain is produced. Where flooding of the fields is possible, the nymphs and adults rise to the surface of the water and can be collected and destroyed. Infestation continues in the stubble and growth of the previous crop. Every care should be taken to plant only clean seedlings. An egg parasite checks the numbers to some extent. Another bug, *Leptocorisa varicornis*, sucks the juices of the developing grain, and is able to live on the inflorescences of various grasses, which may provide food for it until the grain of the new crop has reached the milk stage. Grasses should be kept down in the vicinity of rice fields, and in infested fields hand nets or elongated bags coated inside with a sticky material, such as crude oil emulsion, should be drawn quickly across the fields. The eggs, which are laid in chain formation on the upper surface of the leaves, should also be collected. The Jassid, *Nephotettix bipunctatus*, often becomes a serious pest shortly after the rice is planted, by sucking the juices of the leaves. Kerosene emulsion, not stronger than 2 per cent., is an effective remedy when sprayed on the plants.

Stem-borers include *Schoenobius incertellus* (*bipunctifer*) and *Diatraea auricilia*, which kill the flowering shoots and retard ripening of the crop. The measures described for the bugs are applicable to these borers. In small areas the juice extracted from *Derris elliptica* is most effective, but can only be used where the rice is grown in water that is not mixed later with the drinking supply. The leaves are damaged from time to time by caterpillars of *Parnara mathias*, *Nymphula depunctalis*, *Melanitis ismene* and *Spodoptera pecten*. The Nematode, *Tylenchus angustus*, sometimes damages the roots and young shoots

by sucking out their juices. A mole-cricket, *Gryllotalpa borealis*, often destroys many seedlings, but can be guarded against by lowering the nursery beds until they are just covered with water, or the insects can be attracted to a poison bait consisting of 30 parts broken rice or rice bran, 2 parts sugar, 1 part white arsenic and 10 parts juice of limes, placed in small heaps 5 or 6 feet apart. The eggs of the above-mentioned bugs, and those of *S. incertellus* and *Spodoptera pecten* are frequently present on nursery plants; these should all be removed before the plants are transplanted.

The most important pests of stored rice are *Calandra oryzae* (rice weevil), *Sitotroga cerealella* (Angoumois grain moth), *Ephestia kühniella* (Mediterranean flour moth), *Tribolium castaneum* (small red beetle) and *Silvanus surinamensis* (saw-toothed grain beetle). The natives of Malaya are generally in the habit of storing rice in the husk, as it is less subject to insect attack; the necessity for air-tight bins is pointed out, and in these the grain can easily be fumigated with 2 to 3 lb. of liquid carbon bisulphide to 1,000 cu. ft. of space.

TAKAHASHI (R.). **Aphididae of Formosa. Part 2.**—*Dept. Agric. Govt. Res. Inst., Formosa.* Rept. no. 4, 173 pp., 9 pls. March 1923.

In this second report in Japanese [*R.A.E.*, A, x, 408] on the Aphids of Formosa, 27 species are recorded for the first time from the island, of which 12 are described as new. Some new or little-known Japanese species are also described. The results of the field observations on these insects in Japan, as well as in Formosa, some notes on the aphidicolous ants, and a food-plant catalogue of the Formosan Aphids are also given.

The new species are :—*Macrosiphum cirsicola* on *Cirsium japonicum*, *M. debilis* on *Lactuca debilis*, *M. taiwana* on an unknown plant, *Myzus tropicalis* on *Prunus persica*, *M. formosanus* on *Polygonum chinensis*, *M. boehmeriae* on *Boehmeria nivea*, *Amphorophora formosana* on an unknown plant, *A. sonchifoliae* on *Sonchus arvensis*, *Aphis horii* on *Cirsium dipsacalepsis*, *Myzocallis yokoyamai* on *Quercus* sp., *Drepanaphis tokyoensis* on *Acer* sp., *Eutrichosiphum minutum* on *Trachelospermum jasminoides*, *Dilachnus piniformosanus* on *Pinus* spp., *Oregma orientalis* on *Anthraxon ciliaria* (?), *Astegopteryx fici* on *Ficus retusa*, and *A. japonica* on a Composite.

Some of the results of the field observations are given. Owing to the absence of a very cold season near Taihoku, almost all Aphids are continuously viviparous throughout the year, no sexual forms being produced. The oviparous females of almost all the APHIDINAE are wingless, but those of *Greenidea*, *Cervaphis quercus*, Tak., and *Neophyllaphis* are always provided with wings. Two types are recognised among the brachypterous forms. *Oregma bambusicola*, Tak., is sometimes found in the nest of a termite, *Capritermes nitobei*, Shiraki.

EHRHORN (E. M.). **Reports of the Chief Plant Inspector, February and March 1923.**—*Hawaiian Forester & Agriculturist*, xx, no. 2, pp. 63–67. Honolulu, April–June 1923.

The pests intercepted in February and March 1923 included: from Australia, larvae, pupae and puparia of potato tuber moth [*Phthorimaea operculella*]; from China, *Rhopalosiphum* sp. on *Caladium*, *Parlatoria*

pergandei on *Citrus, Tribolium castaneum* (*ferrugineum*) and a Scolytid in rice, and *Parlatoria zizyphus* and *Lepidosaphes beckii* on pomelos; from Japan, *Cremastogaster laboriosa, Iridomyrmex itoi, Solenopsis geminata* and other ants in *Paulownia* logs, *Pseudaonidia trilobitiformis* and *Parlatoria pergandei* on tangerines, *Diaspis* (*Aulacaspis*) *pentagona* on an undetermined plant, *Bruchus pisorum* in dry peas and *Chionaspis* sp. and *Parlatoria* sp. on sand pears; from Ecuador *Bruchus chinensis* and *Lasioderma serricorne* in tree seeds; from Guam *Lepidosaphes* sp., Psocids and thrips on coconuts; from Java, a Scolytid in tree seeds; and from Philippines a Staphylinid in banana plants, and *Calandra* (*Sitophilus*) *oryzae* in rice.

TORRES (A. F. M.). **Uma terrivel praga da batatinha,** *Phthorimaea operculella* **(Zell.) Meyr.** [A terrible Potato Pest, *P. operculella*.] —*Chacaras e Quintaes*, xxvii, no. 6, pp. 493–499, 4 figs. S. Paulo, 15th June 1923.

In view of the threatened danger to potato crops in Brazil by *Phthorimaea operculella*, Z., examples of which have been found in imported shipments of potatoes, a brief description is given of the various stages of this moth, with particulars of its control.

MOREIRA (C.). **Os insectos damninhos. xxix. A broca da mandioca,** *Leiomerus granicollis*, **Pierce.** [Injurious Insects. xxix. The Cassava Borer, *L. granicollis*.]—*Chacaras e Quintaes*, xxvii, no. 6, pp. 517–518, 3 figs. S. Paulo, 15th June 1923.

Leiomerus granicollis, Pierce [R.A.E., A, v, 129] has recently appeared in cassava plantations in the Brazilian State of S. Paulo and is responsible for considerable damage there. The adult weevil oviposits in the bark, and the larva bores into the medullary tissue and kills the plant. Infestation is revealed by the sawdust-like excreta and by the plant juices that sometimes flow out of the bore-holes. The larvae do not infest the underground portions of the plant, and if the crop is mature, the tubers may be harvested. All infested plants in the plantations should be removed and burnt.

MOREIRA (C.). **Bezouro prejudicial aos quiabos.** [A Beetle injurious to *Hibiscus esculentus*.]—*Chacaras e Quintaes*, xxvii, no. 6, pp. 534–535. S. Paulo, 15th June 1923.

Collection is the measure advised against a Rutelid beetle, *Macraspis moris*, Burm., which feeds on the flowers of *Hibiscus esculentus*, and the larvae may be killed by injecting carbon bisulphide into the ground.

SEVERIN (H. C.). **The Chinch Bug.**—*S. Dakota Agric. Expt. Sta.*, Bull. 202, pp. 562–576, 2 figs. Brookings, S.D., April 1923.

The bulk of the information contained in this paper on *Blissus leucopterus*, Say, has already been noticed [*R.A.E.*, A, xi, 55]. *Eumicrosoma benefica*, Gahan, is recorded as a parasite of it.

MORRISON (H.). U.S. Bur. Ent. **A Report on a Collection of Coccidae from Argentine. II. (Hemiptera, Coccidae).**—*Proc. Ent. Soc. Wash.*, xxv, no. 5–6, pp. 122–126, 1 plate. Washington, D.C., May–June 1923.

The remainder of the species included in the material collected in the Argentine during 1909–11 are here recorded together wit

some additions and corrections to the paper previously published [*R.A.E.*, A, vii, 307]. The species are *Icerya subandina*, Leonardi, *Lecanium perinflatum*, Ckll., *L. viticis*, sp. n., on *Vitex montevidensis*, *Leucaspis pusilla*, Loew, *Aspidiotus hederae*, Vallot, *A. latastei*, Ckll., *Chrysomphalus aonidum*, L., *C. dictyospermi* var. *pinnulifera*, Mask., and *C. paulistus*, Hemp.

Snyder (T. E.). U.S. Bur. Ent. **Three new Termites from the Canal Zone, Panama.**—*Proc. Ent. Soc. Wash.*, xxv, no. 5–6, pp. 126–131, 1 fig. Washington, D.C., May–June 1923.

The new species described are *Mirotermes panamaensis*, *Orthognathotermes wheeleri*, and *Anoplotermes parvus*.

Chittenden (F. H.). U.S. Bur. Ent. **Notes on the Distribution and Habits of North American** *Phyllotreta* **(Coleop.).**—*Proc. Ent. Soc. Wash.*, xxv, no. 5–6, pp. 131–139, 1 plate. Washington, D.C., May–June 1923.

Flea-beetles of the genus *Phyllotreta* have been studied in recent years in regard to their occurrence on cruciferous crops. The species dealt with are *P. zimmermanni*, Crotch, *P. vittata*, F., *P. vittata discedens*, Weise, *P. undulata*, Kutsch., *P. liebecki*, Schaeffer, *P. oregonensis*, Crotch, *P. bipustulata*, F., *P. aeneicollis*, Crotch, *P. pusilla*, Horn., *P. armoraciae*, Koch, and *P. lewisi*, Crotch.

Kelsall (A.). **The Use of Aluminium Sulphate in Place of Copper Sulphate in Insecticide-Fungicide Combinations.**—*Proc. Acadian Ent. Soc. 1922*, no. 8, pp. 8–17. Fredericton, N.B., April 1923.

In the experiments here described, mixtures of aluminium sulphate and lime were found to have some fungicidal action. As a repellent for the potato flea-beetle [*Epitrix cucumeris*, Har.], they were slightly less effective than Bordeaux mixture.

Both on apple and potato, white arsenic in the form of D.E.L. mixture (composed of 50 per cent. white arsenic and 50 per cent. hydrated lime) was used in conjunction with aluminium sulphate and lime without injury to the foliage. In the case of apple the mixture was composed of $\frac{3}{4}$ lb. D.E.L. to 40 gals. water containing 6 lb. aluminium sulphate and 10 lb. hydrated lime. In the case of D.E.L., copper sulphate and lime the best results on potatoes were obtained by mixing the ingredients in a certain order, but when aluminium sulphate was substituted for copper sulphate the order of mixing did not apparently vary the degree of efficacy. Even when double the amount of arsenic generally required was used no injury to the plants was noticed. It is evident that aluminium sulphate-lime mixtures greatly reduce the danger accompanying the use of white arsenic. As a general insecticide the following formula might prove effective: 5 lb. aluminium sulphate, 5 lb. hydrated lime, $2\frac{1}{4}$ lb. D.E.L. mixture and 100 gals. water. This mixture would contain the same amount of arsenic and would be at least equal in poisoning value to 4 lb. of dry lead arsenate at a little more than half the cost of the latter.

GORHAM (R. P.). **Insect Pests of the Year 1922, in New Brunswick.**—*Proc. Acadian Ent. Soc. 1922*, no. 8, pp. 18–22. Fredericton, N.B., April 1923.

The insects recorded include *Malacosoma americana* and *M. disstria*, which caused considerable damage in unsprayed orchards and large areas of poplar woodland; *Coleophora laricella* (larch case bearer), very noticeable during May on larches; *Lygaeonematus erichsoni* (larch sawfly), particularly injurious, all larches of more than five or six years growth being wholly defoliated; *Phorbia cilicrura*, Rond. (*Pegomyia fusciceps*, Zett.) (seed corn maggot), causing considerable damage to seedling beans in certain places; *Leptinotarsa decemlineata* (potato beetle), the adults of which were found to eat their own eggs on cool days in spring and summer; *Bucculatrix canadensisella* (birch leaf skeletoniser), more abundant than usual in some parts of the Province; *Estigmene acraea* (salt marsh caterpillar), larvae of which were abundant in the autumn; *Hyphantria cunea* (fall webworm), increasing in abundance over the southern part of the Province, the parasite *Therion morio* being also more numerous; *Halisidota maculata* (oak tussock caterpillar), particularly abundant near Fredericton, the larvae feeding on a variety of trees and bushes; *Acronycta dactylina*, which appeared in large numbers on alder, willow, birch and poplar and was heavily parasitised; *Argyresthia thuiella* (arbor-vitae leaf miner), slightly less abundant, the larvae hibernating in hollowed out tips of branches; *Pissodes strobi* (white pine weevil), present in large numbers; *Eulia politana* (pine tube moth), conspicuous on white pine [*Pinus strobus*]; and *Anthonomus signatus*, Say (strawberry weevil), which is becoming increasingly injurious amongst strawberries.

MACANDREWS (A. H.). **Some Notes on the Natural Control of the Pine Bark Aphid (*Chermes pinicorticis*, Fitch) in New Brunswick, 1922.**—*Proc. Acadian Ent. Soc. 1922*, no. 8, pp. 52–56. Fredericton, N.B., April 1923.

Chermes pinicorticis, Fitch, is a native of North America and appears to be generally distributed over the range of its food-plant, the white pine (*Pinus strobus*). Young pines grown under more or less artificial conditions and those growing around farm wood lots or old cuttings show a greater infestation than those grown in forests. During 1922 old and young trees alike were infested in New Brunswick; in the case of the larger trees the limbs and the smooth top of the main stem were attacked, whereas in younger trees the entire trunk and limbs were covered. The eggs begin to hatch early in May, and the nymphs mature in about three weeks. The wingless females then deposit the eggs of the next brood in downy balls at the base of the needles. As all the Aphids had practically disappeared by the middle of June the life-history studies could not be continued further.

Anatis quindecimpunctata, Oliv., var. *mali*, Say, *Syrphus arcuatus*, Fall., and *Hemerobius stigmaterus*, Fitch, are responsible for the control of *C. pinicortitis* in New Brunswick. Details are given of the life-histories of these species.

BRITTAIN (W. H.). **Papers on the Leaf Hoppers (Cicadellidae) of Nova Scotia. I. External Morphology.**—*Proc. Acadian Ent. Soc. 1922*, no. 8, pp. 57–67, 5 plates. Fredericton, N.B., April 1923.

The contents of this paper are indicated by its title.

BRITTAIN (W. H.) & WHITEHEAD (W. E.). **Papers on the Leaf Hoppers of Nova Scotia, II.**—*Proc. Acadian Ent. Soc. 1922*, no. 8, pp. 128-146, 7 plates. Fredericton, N.B., April 1923.

This paper forms the first instalment of the results of studies on the CICADELLIDAE of Nova Scotia. Keys are given to the subfamilies, and to the genera of the BYTHOSCOPINAE, as well as to the species of *Idiocerus*.

KELSALL (A.). **Sulphur Dust as an Insecticide.**—*Proc. Acadian Ent. Soc. 1922*, no. 8, pp. 96-101. Fredericton, N.B., April 1923.

During 1919-1921 the two chief dusts used in Nova Scotia apple orchards were composed of 90 per cent. superfine sulphur and 10 per cent. lead arsenate, and 10 per cent. dehydrated copper sulphate, 5 per cent. calcium arsenate and 85 per cent. hydrated lime respectively. For the control of fungous diseases and leaf-eating insects such as the tent caterpillar [*Malacosoma*] both dusts proved effective, but for insects such as the bud moth [*Eucosma ocellana*] and green fruit caterpillar [*Xylina*] the first was undoubtedly of greater value. General observations have shown that the effectiveness of dust control is proportionately greater the heavier the infestation. Further experiments carried out in 1922 confirm the efficacy of the first-named dust, even when the formula for the second was slightly altered so that the same amount of arsenic was applied with each, the inference being that arsenic is less toxic in combination with copper than with sulphur and that sulphur in itself possesses some insecticidal properties. That the insecticidal property of sulphur was responsible in part was confirmed by an experiment with a sulphur dust in which the 10 per cent. of lead arsenate was replaced by calcined infusorial earth.

BAIRD (A. B.). **Some Notes on the Natural Control of the Larch Sawfly and Larch Case Bearer in New Brunswick in 1922.**—*Proc. Acadian Ent. Soc. 1922*, no. 8, pp. 158-171. Fredericton, N.B., April 1923.

The previous outbreaks of *Lygaeonematus erichsoni*, Hart. (larch sawfly), the last of which occurred between 1906 and 1909, were eventually controlled by the death of the larch trees as a result of repeated defoliation. The present infestation has been in progress for the past two or three years and appears to be general over the Province. The life-history as occurring under local conditions and as observed in the laboratory is discussed.

Various birds have been found feeding on the larvae of this sawfly, in which stage it is also parasitised by the Tachinid, *Frontina tenthredinidarum*, Towns. The eggs are deposited on any part of the host, as many as 15 on one larva. They do not apparently hatch until the host larva has spun its cocoon. Hibernation occurs as a first stage maggot in the larva of the host inside the cocoon, and when full grown, the parasitic larva leaves the host to pupate in the ground. There are apparently two complete generations a year, though further observations are required to confirm this. About 15 per cent. of *L. erichsoni* are parasitised by this fly. Various insects are predacious on the larvae of *L. erichsoni*, but all of them together only destroy about 1 per cent. of the sawflies, the fungus *Isaria farinosa* being also very scarce. A list is given of parasites reared from *L. erichsoni* outside New Brunswick.

Coleophora laricella, Hb. (larch case-bearer) feeds chiefly in the early part of the season, thus reducing the vitality of the tree and hastening the work of *L. erichsoni*. A brief account is given of its life-history and habits. Birds appear to be the chief factor controlling this moth. The percentage of parasitism is very low. The Chalcids and Braconids attacking the pupal stage have not yet been identified. A list is given of the parasites reared from *C. laricella* in Europe.

TOTHILL (J. D.). **Notes on the Outbreaks of Spruce Budworm, Forest Tent Caterpillar and Larch Sawfly in New Brunswick.**—*Proc. Acadian Ent. Soc. 1922*, no. 8, pp. 172–182. Fredericton, N.B., April 1923.

One of the important features of the present outbreak of the spruce budworm [*Tortrix fumiferana*, Clem.] in New Brunswick has been the comparative immunity of spruce. In the case of red spruce (*Picea rubra*) and bog spruce (*P. mariana*) this immunity is apparently the result of the prolonged interval occurring between the emergence of the larvae from hibernation and the bursting of the buds. In the case of white spruce (*P. canadensis*) the cause of immunity is not so clear, but may sometimes be due to the activities of birds. The severity of the present outbreak is largely due to the increase of the balsam fir [*Abies balsamea*] in the eastern forests during the past century, especially the latter part of it. In the new growth that will form the forests of the future, the proportion of fir is even greater than in the mature stands, and appears to be still increasing, so that the next outbreak is likely to be more severe still and extend over a greater area. On the basis of average annual growth this may be expected in about 30 years' time, when the firs become tall enough to pass through the crown of the forest and so form an immense food supply. At all places where the favourite food-plant was present in abnormally large quantities in New Brunswick the natural control exercised by birds and parasites was not sufficient to suppress *T. fumiferana* until it became practically starved out of existence, whereas in British Columbia the numbers of the moth were reduced by natural checks before any of the trees were killed, and in the following year the outbreak subsided entirely as a result of the activities of birds against a smaller number of larvae. In certain localities the important parasite *Phytodictus* [*fumiferanae*, Rohw.] occurs. To prevent serious outbreaks in New Brunswick in the future, the introduction of this parasite from British Columbia is suggested, and also the regeneration of forests by cutting out fir and encouraging spruce and pine [*cf. R.A.E.*, A, xi, 268].

Outbreaks of *Malacosoma disstria* have become more frequent and severe and more widespread in eastern Canada during the past century, which is also considered to be the result of altered forest conditions. In the case of this moth remedial measures should aim at reducing the numbers of the favourite food-plants, the poplars (*P. tremuloides* and *P. grandidentata*), in place of which it is suggested that mixed stands of white and red spruce, fir and red pine [*Pinus resinosa*] should be tried.

About 40 years ago the commercial crop of tamarack (*Larix americana*) was destroyed by an outbreak of *Lygaeonematus* (*Nematus*) *erichsoni*, probably combined with one of *Coleophora laricella*, and as these insects are widely distributed over eastern Canada and

in New Brunswick, similar outbreaks are likely to be repeated when the present tamarack stands reach commercial size.

The importance of preventing such a calamity is pointed out, and it is suggested that numerous parasites that apparently make the occurrence of these pests negligible in Europe might prove of similar value if introduced into Canada.

MUESEBECK (C. F. W.). U.S. Bur. Ent. **A Revision of the North American Species of Ichneumon-flies belonging to the Genus** *Meteorus*, **Haliday.**—*Proc. U.S. Nat. Mus.*, lxiii, Art. 2, no. 2470, 44 pp., 2 figs. Washington, D.C., 1923.

An attempt is made to define the limits of the Braconid genus *Meteorus*, Haliday, and a key is given to enable workers in parasitic Hymenoptera to identify the North American species of this group. A number of new species are described, several of which are apparently of common occurrence. *M. autographae*, sp. n., was reared from *Phytometra* (*Autographa*) *brassicae*, Riley, *Laphygma frugiperda*, S. & A., *Cirphis unipuncta*, Haw., *Plathypena scabra*, F., *Evergestis straminalis*, Hb., *Phlyctaenia ferrugalis*, Hb., *Alsophila pometaria*, Harris, etc. It is more common in the southern part of the United States, east of the Mississippi than further north, and has a wide range of hosts, but with a distinct preference for Noctuid larvae. *M. datanae*, sp. n., was reared from *Datana integerrima*, G. & R., *D. ministra*, Drury, and *D. angustii*, G. & R., in the north-eastern United States.

FRANK (A.). **Some Common but Unfamiliar Fruit Pests.**—*Bi-Mthly. Bull. Western Washington Expt. Sta.*, xi, no. 2, pp. 38-41. Puyallup, Washington, July 1923.

A short account is given of some less known pests of fruit bushes and trees, that are becoming increasingly destructive. They include *Pulvinaria vitis*, L. (cottony maple scale), most common on gooseberry, quince and pear; *Eulecanium* (*Lecanium*) *corni*, Bch., on apple, pear, plum, cherry and gooseberry; *Monophadnus* (*Monophadnoides*) *rubi*, Harr. (raspberry sawfly), the larvae of which eat irregular holes in the leaves and sometimes devour also the tender bark of new shoots and blossom buds and young fruit, and for which a spray of 1 lb. lead arsenate to 25 U.S. gals. of water is recommended; *Olethreutes* (*Exartema*) *permundana*, Clem. (raspberry leaf-roller), which deforms and webs together the terminal leaves, and should be destroyed by picking off the infested leaves or tips, or, if too numerous for this treatment, by means of lead arsenate sprays; *Byturus unicolor*, Say (American raspberry beetle), which feeds on the buds and tender leaves and sometimes on the blossoms, and may be checked by a spray of 1 lb. lead arsenate to 35 U.S. gals. of water applied to the new foliage until the shoots are 18 in. to 2 ft. high; *Phorbia rubivora*, Coq. (cane maggot of raspberry, loganberry and blackberry), the larvae of which work in the canes, causing them to wilt and die, and for which the only remedy is to cut off the affected shoots several inches below the girdle and burn them; and *Eriophyes pyri*, Pag. (pear leaf-blister mite), which works inside the tissue of the pear leaves and lives during the winter on the bud scales, and for which lime-sulphur sprays 1 : 10, applied in autumn after the leaves have dropped, or in spring just as the buds are opening, are the best remedy.

Stene (A. E.). **Suggestions for Orchard Spraying.**—*Rhode Island State Bd. Agric.*, Ent. Dept., Circ. 2, 4 pp. [*sine loco*] April 1923.

A spray calendar is suggested for apples, pears, peaches, cherries, plums and grapes for average conditions in Rhode Island. The preparation of several well-known spraying mixtures is described, and general recommendations for spraying are given.

Spuler (A.). **The Orchard Leaf-roller.**—*Washington Agric. Expt. Sta.*, Bull. 172, 9 pp. Pullman, Wash., November 1922. [Received 23rd July 1923.]

A brief account is given of the distribution, life-history and habits of *Tortrix* (*Archips*) *argyrospila* (orchard leaf-roller) [*R.A.E.*, A, ix, 585]. Many experiments with miscible oil and contact sprays are described; these indicate that just before hatching of the eggs a thorough spraying should be made with a reliable miscible oil [*cf. R.A.E.*, A, x, 134]. Such an oil, when properly emulsified, is considered safe for apple trees, unless the spraying is preceded or followed by excessively cold weather; 20° F. below zero is arbitrarily suggested as the minimum temperature for the process. In cases of severe infestation the spray should be supplemented by an arsenical spray of 2 lb. lead arsenate to 50 U.S. gals., applied as soon as the eggs have hatched. The addition of more arsenate or of syrup does not materially increase the efficiency of the spray. Nicotine dust and liquid sprays of nicotine sulphate have given no practical control.

Milbrath (D. G.). **The Rootknot Nematode in Relation to Deciduous Fruit Trees and Grapevines.**—*Mthly. Bull. Cal. Dept. Agric.*, xii, no. 3–4, pp. 127–135, 7 figs. Sacramento, Cal., March–April 1923.

The presence of Nematodes [*Heterodera radicicola*] in roots of nursery stock of orchards and vineyards or in the soil in which the plants are placed is a source of great loss owing to the formation of rootknot on the infested roots. The effect on deciduous trees and grapevines may be to produce dwarfed growth and a reduced crop or it may cause sudden wilting and death. Sandy soils are always more favourable to Nematode infestation, and shallow soils assist the pest by obstructing root development. The knots eventually cut off the food and water supply from the root. Infestation was observed in several varieties of peach, walnut, almond, olive and several varieties of apple. Many kinds of grapevines are susceptible, but certain kinds of apricots are apparently resistant. The various means by which infestation can be introduced are discussed, and the importance of maintaining Nematode-free conditions is urged. The method of soil disinfection recommended by Byars and Gilbert [*R.A.E.*, A, vii, 323] is advocated. The essential points are the prevention of introduction of the Nematode and the discovery and propagation of immune root-stocks. The application of fertilisers and chemicals in an infested orchard has not proved an efficient remedy, though in some cases the life of the orchard can be slightly prolonged by such means.

Nougaret (R. L.). **Rootknot on Grape.**—*Mthly Bull. Cal. Dept. Agric.*, xii, no. 3–4, pp. 139–150, 4 figs. Sacramento, Cal., March–April 1923.

A brief account is given of the biology and life-history of *Heterodera radicicola*, the Nematode causing rootknot in grapevines. When

nursery stock was planted on soil where sugar-beets, heavily infested with the sugar-beet Nematode, *H. schachtii*, had been grown, it was found that two lots of grapes of different varieties were also attacked by that species.

WEISS (H. B.) & LOTT (R. B.). **Notes on *Trichothrips ulmi* (Fab.) in New Jersey.**—*Bull. Brooklyn Ent. Soc.*, xviii, no. 3, pp. 94–97. Brooklyn, N.Y., June 1923.

Trichothrips ulmi, F., is widely distributed in New Jersey, where it is found under dead bark and in numerous species of fungi, a list of which is given. The early stages of this thrips are described.

BRANDES (E. W.) & KLAPHAAK (P. J.). **Cultivated and Wild Hosts of Sugar-cane or Grass Mosaic.**—*Jl. Agric. Res.*, xxiv, no. 3, pp. 247–262, 4 plates. Washington, D.C., 21st April 1923.

Thirteen species of grasses have been proved by inoculation experiments to be susceptible to the disease known as sugar-cane or grass mosaic. Certain sugar-canes of the north Indian type, formerly regarded as immune, have proved susceptible. Field observations indicate that natural infection of *Sorghum*, pearl millet, and various grasses is widespread near affected cane in the sugar-belt. All species tested for seed transmission of mosaic gave negative results.

Many insects have been tested as possible carriers of the disease, but the authors have only proved transmission in the case of *Aphis maidis*; this agrees with the results of Ledeboer who also found *A. sacchari* implicated [*R.A.E.*, A, ix, 535]. Several grasses that are very difficult or impossible to infect artificially by inoculation become readily infected by the use of virulent Aphids. While it is usually difficult to establish *A. maidis* on sugar-cane in the greenhouse by transferring it from other grasses, the insect sometimes migrates naturally to the cane in large numbers. Maize, *Sorghum* and pearl millet are the favourite food-plants of this Aphid, which is often found on them in enormous numbers and constitutes an ideal carrier of the disease to these crops. Several species of leafhoppers have been suspected of acting as carriers owing to strong indirect evidence, but no positive proof of this has been found.

SWENK (M. H.). **The Plains False Wireworm and Its Control.**—*Nebraska Agric. Expt. Sta.*, Circ. 20, 11 pp., 3 figs. Lincoln, Neb., July 1923.

Eleodes opaca has been seriously injurious to the last three crops of winter wheat in Nebraska, where it is frequently mistaken for a wireworm. The larvae destroy the planted seed in autumn and eat the roots of young plants in autumn and spring. The life-history and form of injury are described. Natural enemies include the Braconid, *Perilitus eleodis* and the Sarcophagid, *Sarcophaga eleodis*, though the value of these parasites is doubtful, the fungi, *Sporotrichium globuliferum* and *Metarrhizium anisopliae*, and a bacterial disease. Birds devour a certain number of larvae. No satisfactory treatment of the seeds to repel or poison the larvae is known. As the principal injury is done by the nearly full-grown larvae between mid-September and mid-November, much injury might be avoided by sowing the winter wheat about the middle of October. The greatest damage always occurs after a dry season, when the larvae can work easily

through the soil. If fields are thoroughly summer tilled, they are unattractive to the beetles, as they do not provide food and shelter for them; but in grass land broken in spring or early summer, in time for weeds to grow, the conditions are favourable for oviposition. If the sowing of spring wheat can be delayed until late April, it will probably escape injury.

A promising remedy against the adult beetles is a poison bait prepared by mixing, dry, 25 lb. coarse wheat bran and 1 lb. Paris green and then adding ¾ oz. amyl acetate in enough water to make a stiff mash. This amount should cover several acres. As eggs are laid from early July, but chiefly during August, the bait should be spread especially in the latter half of July, in order to poison the beetles before oviposition has taken place. If furrows be ploughed 100 to 300 yards apart across beetle-infested fields, and along their edges, and the poison bait scattered lightly in the furrows, much less bait will be required and many beetles are attracted to the furrows. This measure will probably be necessary for two seasons before complete control is obtained.

MUTCHLER (A. J.) & WEISS (H. B.). **Beetles of the Genera** *Saperda* **and** *Oberea* **known to occur in New Jersey.**—*New Jersey Dept. Agric.*, Circ. 58, 26 pp., 10 figs. Trenton, N.J., February 1923.

Keys are given to the species of *Saperda* and *Oberea*, many of those occurring in New Jersey being of economic importance. There are also brief notes on the distribution and habits of these Cerambycids as well as the usual remedial measures employed.

FERRIS (G. F.) & KELLY (J. B.). **Some Coccidae from about the Gulf of California.**—*Proc. Cal. Acad. Sci.*, 4th Ser., xii, no. 14, pp. 315–318, 1 fig. San Francisco, 10th July 1923.

The species recorded include *Lecaniodiaspis tapirirae*, sp. n., from *Tapirira edulis* on Ceralbo Island.

BOGDANOV-KATKOV (N. N.). **К методике энтомо-агрономических иследований.** [On the Method of Entomo-Agronomical Observations.]—**Петроградс. Агроном. Инст. Научно-Исследовательный Отд. Энт. Станц.** [*Petrograd Agron. Inst. Sci. Invest. Dept., Ent. Sta.*], Ser. A, no. 3, 35 pp., 2 figs., 12 tables. Petrograd, 1922. [Received 23rd July 1923.]

These investigations were made in the Petrograd region. Contrary to Kurdyumov's observations, the author found that not only the side shoots but even the main shoots of oats may be attacked by *Oscinella* (*Oscinis*) *frit*, L. In studying infestations, it is essential to make sure of the point of attack and the number of shoots present in the infested plant, as the ultimate injury to the plant naturally depends on the proportion of shoots attacked. There does not appear to be any variety of oats entirely immune from attack by this fly, though some show greater resistance than others. The planting of resistant varieties and the alteration of the time of planting are not recommended, as it is thought that this pest would soon adapt itself to apparently unfavourable conditions. Further information is required on the effect of soil fertilisation on the resistance of the plants to attack by *O. frit*.

PLOTNIKOV (I. V.). **О Туркестанских организациях по борьбе с вредителями за 10-летие 1911-21 гг.** [Turkestan Organisations for Control of Pests for the 10 Years 1911–21.]—**Бюллетень 3-го Всероссийского Энтомо-Фитопатологического Съезда в Петрограде 18-25 декабря 1921 г.** [*Bull. 3rd All-Russian Entomo-Phytopath. Meeting in Petrograd 18th–25th December 1921*], no. 1, pp. 8–13. Petrograd, 18th December 1921. [Received 23rd July 1923.]

The work of the Turkestan organisations for the control of pests during the pericd 1911–21 is briefly reviewed.

UGRYUMOV (G. D.). **Сообщение о работах научно-исследовательской газовой экспедиции 1921 года.** [Report on the Work of the Gas Research Expedition in 1921.]—**Бюллетень 3-го Всероссийского Энтомо-Фитопатологического Съезда в Петрограде 18-25 декабря 1921 г.** [*Bull. 3rd All-Russian Entomo-Phytopath. Meeting in Petrograd 18th–25th December 1921*], no. 2, pp. 1–13. Petrograd, 19th December 1921. [Received 23rd July 1923.]

The principal results of the experiments with chlorine gas against the Asiatic locust [*Locusta migratoria*, L.] conducted in 1921 in the Kuban province have been recorded from other sources [*R.A.E.*, A, x, 431; xi, 140]. The author's conclusion is that the method may be treated as a supplementary one for destroying locusts in localities where other methods are not practicable, but it is very costly, as much as 1 lb. of chlorine gas being necessary to kill 2 lb. of locusts. Careful investigation in the laboratory must precede further field experiments.

SKORIKOV (A. S.). **Шмели на службе у сельского хозяйства.** [Bumble-bees in the Service of Agriculture.]—**Бюллетень 3-го Всероссийского Энтомо-Фитопатологического Съезда в Петрограде 18-25 декабря 1921 г.** [*Bull. 3rd All-Russian Entomo-Phytopath. Meeting in Petrograd, 18th–25th December 1921*], no. 5, pp. 1–14. Petrograd, 8th December 1922. [Received 23rd July 1923.]

The service rendered to agriculture by bumble-bees is discussed with special reference to the pollination of red clover. Particulars of the species of *Bombus* concerned in Russia are given.

ZNAMENSKI (A. V.). **Сообщение Энт. Отд. Полтавской С.Х. Опыт. Станции.** [Report from the Ent. Dept. Poltava Agric. Expt. Sta.]—**Бюллетень 3-го Всероссийского Энтомо-Фитопатологического Съезда в Петрограде 18–25 декабря 1921 г.** [*Bull. 3rd All-Russian Entomo-Phytopath. Meeting in Petrograd, 18th–25th December 1921*], no. 7, pp. 1–4. Petrograd, 24th December 1921. [Received 23rd July 1923.]

The insect pests dealt with by the Poltava Agricultural Experiment Station at various times have included the Swedish fly [*Oscinella frit*], wireworms, *Bruchus pisorum* (*pisi*), *B. rufimanus*, *Meromyza* sp., and *Nabis ferus*.

Dobrovolski (N. A.). **Вредные насекомые в Кубанской Области по наблюдениями 1921 года.** [Injurious Insects of the Kuban Province observed in 1921.]—**Бюллетень 3-го Всероссийского Энтомо-Фитопатологического Съезда в Петрограде 18-25 декабря 1921 г.** [*Bull. 3rd All-Russian Entomo-Phytopath. Meeting in Petrograd, 18th–25th December 1921*], no. 7, pp. 4-7. Petrograd, 24th December 1921. [Received 23rd July 1923.]

Owing to the abundance of locusts in the Kuban Province and in view of the very limited staff available, little attention can be given to other insect enemies, so that the present list of pests recorded for 1921 cannot be considered as in any way complete. Those mentioned are *Locusta migratoria*, L.; *Oedaleus nigrofasciatus*, DeG.; *Calliptamus italicus*, L.; *Dociostaurus* (*Stauronotus*) *maroccanus*, Thunb.; *Eurygaster integriceps*, Osh., and *E. maura*, L., the eggs of these bugs being parasitised by *Telenomus sokolowi*, Magr., *T. semistriatus*, Nees, and *Phasia crassipennis*, F.; *Mesocerus marginatus*, L., on young pear shoots; *Stephanitis pyri*, F., on wild and cultivated apples; *Psylla pyricola*, Först.; *Eriosoma lanigerum*, Hausm.; *Zabrus gibbus*, F. (*tenebrioides*, Goeze), on wheat; *Rhynchites bacchus*, L.; *R. pauxillus*, Germ.; *R. versicolor*, Costa; *Byctiscus betulae*, L.; *Anthonomus pomorum*, L.; *Dorcadion carinatum*, Pall., and *D. fuliginator* var. *vittigerum*, F., chiefly on winter sown wheat; *Chaetocnema aridula*, Gyll., on wheat and barley; *Cassida nebulosa*, L., on orache [*Atriplex*]; *Lema melanopa*, L., on late oats and barley; *Nygmia phaeorrhoea*, Don. (*Euproctis chrysorrhoea*, L.); *Hyponomeuta malinellus*, Zell., *Oria* (*Tapinostola*) *musculosa*, Hb.; *Loxostege* (*Phlyctaenodes*) *sticticalis*, L.; *Cephus pygmaeus*, L.; *Trachelus tabidus*, F.; and *Hoplocampa fulvicornis*, Klug, on plums.

Plotnikov (V. I.). **О партеногенезе у саранчевых.** [On Parthenogenesis in Locusts.] (Abstract.)—**Бюллетень 3-го Всероссийского Энтомо-Фитопатологического Съезда в Петрограде 18-25 декабря 1921 г.** [*Bull. 3rd All-Russian Entomo-Phytopath. Meeting in Petrograd, 18th–25th December 1921*], no. 7, p. 9. Petrograd, 24th December 1921. [Received 23rd July 1923.]

Development of an embryo has been observed in the unfertilised eggs of *Calliptamus italicus*, *Dociostaurus* (*Stauronotus*) *maroccanus*, *Locusta migratoria*, *Oedaleus nigrofasciatus*, and other locusts. In some cases the development proceeds quite normally, while in others it does not go far. From some unfertilised eggs of *L. migratoria* ph. *danica* larvae have been bred, but only one reached the last larval stage. In all cases only females were obtained.

Plotnikov (V. I.). **О грушевой медянице** (*Psylla pyricola* **Först.**).—**Бюллетень 3-го Всероссийского Энтомо-Фитопатологического Съезда в Петрограде 18-25 декабря 1921 г.** [*Bull. 3rd All-Russian Entomo-Phytopath. Meeting in Petrograd, 18th–25th December 1921*], no. 7, p. 10. Petrograd, 24th December 1921. [Received 23rd July 1923.]

The observations described in this résumé were carried out at the Entomological Station of Tashkent in 1914 and 1919. The eggs of *Psylla pyricola*, Först., are laid about the middle of March, the larvae appearing at the beginning of April and the adults at the beginning of

May. In summer the incubation period is from 5 to 10 days, but in spring and autumn as much as 20 days. The larval stage lasts from 26 to 29 days in the summer and up to 40 in September. During the summer there are four generations, and owing to the prolonged life of the females, these overlap. The fourth generation produces dark, winged individuals that hibernate, though it is uncertain whether these are only produced by this generation.

During the winter on frosty days, these Psyllids may be shaken from the trees and destroyed.

Plotnikov (V. I.). **К вопросу о борьбе с яблочной плодожоркой.** [The Question of controlling the Codling Moth.]—**Бюллетень 3-го Всероссийского Энтомо-Фитопатологического Съезда в Петрограде 18-52 декабря 1921 г.** [*Bull. 3rd All-Russian Entomo-Phytopath. Meeting in Petrograd, 18th–25th December 1921*], no. 7, p. 11. Petrograd, 24th December 1921. [Received 23rd July 1923.]

The American method of controlling the codling moth [*Cydia pomonella*, L.] by means of sprays under heavy pressure was tried by the Entomological Station of Tashkent in 1914. Both Paris green and acid lead arsenate were tested, the latter being tried again in 1920. In nearly all cases severe scorching resulted. The efficacy of this method under Turkestan conditions would appear doubtful, but it is hoped to carry out experiments with these insecticides on various kinds of apple and pear in order to ascertain those that are most resistant to scorching.

Plotnikov (V. I.). **Что нужно сделать для пополнения наших знаний о вредных саранчевых.** [What is necessary in order to increase our Knowledge of Locusts.]—**Бюллетень 3-го Всероссийского Энтомо-Фитопатологического Съезда в Петрограде 18-25 декабря 1921 г.** [*Bull. 3rd All-Russian Entomo-Phytopath. Meeting in Petrograd, 18th–25th December 1921*], no. 7, pp. 12–13. Petrograd, 24th December 1921. [Received 23rd July 1923.]

The necessity of collecting material on injurious locusts in Eastern Russia is urged in order to find out the species that are of most economic importance.

Shchegolev (V.). **Озимой червь и борьба с ним.** [*Euxoa segetum*, Schiff., and its Control.]—**Череповецкая Станция Защиты растений от вредителей при Губземуправлении** [*Tcherepovetz Sta. Protect. Plants from Pests*], 24 pp. Tcherepovetz, 1922. [Received 23rd July 1923.]

The larvae of a Noctuid [*Euxoa segetum*, Schiff.] are very injurious to the winter sown crops in Tcherepovetz and were particularly numerous during 1921. This paper includes a popular description of the pest and methods for its control, such as planting fallow land with vetch, the use of poison baits, etc. The clearing up of all weeds and general clean cultivation are considered to be of primary importance.

BOLDYREV (V. F.). **Штрих из жизни капустной белянки.** [An Incident in the Life of the Cabbage Butterfly.]—**Вестник Северной Областной Станции Защиты Растений от Вредителей** [*Herald North. Distr. Sta. Plant Protect.*], no. 2, p. 7. Petersburg, 1st September 1922. [Received 23rd July 1923.]

Several instances are recorded of *Pieris brassicae*, L., ovipositing and developing on nasturtiums in Russia.

IATZENTKOVSKI (A.). **Осенний надзор за лесными вредителями.** [Autumn Review of Forest Pests.]—**Вестник Северной Областной Станции Защиты Растений от Вредителей** [*Herald North. Distr. Sta. Plant Protect.*], no. 2, pp. 7-9. Petersburg, 1st September 1922. [Received 23rd July 1923.]

The more important pests likely to be found in Russian forests are *Ips typographus*, L., *I. sexdentatus*, Boern., *Pityogenes chalcographus*, L., *Dendroctonus micans*, Kug., *Polygraphus poligraphus*, L., *Myelophilus piniperda*, L., *M. minor*, Hart., *Dendrolimus pini*, L., *Panolis flammea*, Schiff. (*piniperda*, Panz.), and *Bupalus piniarius*, L.

These species are briefly discussed. Instructions are given for forest inspection in the autumn with a view to locating these pests and organising future remedial measures.

SITOWSKI (L.). **Strzygonia choinówka** (*Panolis flammea*, **Schiff.**) **i jej pasorzyty na ziemiach polskich.** [*Panolis flammea* and its Parasites observed in Poland.]—Separate from *Rocznikow Nauk Rolniczych*, x, 9 pp., 1 plate. With a Summary in English. Posen, 1923.

The conditions under which *Panolis flammea*, Schiff., has been found in Poland are described. The scarcity of this moth in mixed forests is considered to be due to the larger number of insectivorous enemies present under such conditions and the existence of Ichneumonid and Tachinid parasites. Mixed forests are more advantageous to the development of these parasites than are those consisting entirely of conifers. The parasites bred from *P. flammea* are *Ernestia rudis*, Fall., *Banchus femoralis*, Thoms., *Ichneumon nigritarius*, Grav., *I. bilunulatus*, Grav., *I. pachymerus*, Ratz., *I. linzator*, F., *I. fabricator*, F., *Plectocryptus arrogans*, Grav., *Enicospilus ramidulus*, L., *Aphanistes armatus*, Wesm., and *Pteromalus alboannulatus*, Ratz. In one case *Ichneumon nigritarius* was found in the pupa of *Banchus femoralis*.

SITOWSKI (L.). **Z biologji poprocha cetyniaka** (*Bupalus piniarius* **L.**) **w puszczy Sandomierskiej.** [On the Biology of *Bupalus piniarius* at Sandomierz.]—*Prace Naukowe Uniwersytetu Poznanskiego, Sekcja Rolniczo-Leśna*, no. 2, 4 plates. With a Summary in French. Posen, 1922. [Received 24th July 1923.]

Bupalus piniarius, L., has become unusually abundant among the pine trees of Sandomierz and was particularly injurious during 1917 and 1918. During 1917, 25 per cent. of the larvae were parasitised by the Tachinid, *Lydella nigripes*, Fall., which plays an important part in reducing the numbers of *B. piniarius*; when, however, the parasitism reaches 60 per cent., it is itself parasitised by *Mesochorus politus*, Grav., which though formerly considered to be a parasite of *B. piniarius*, has now been proved to be a hyperparasite.

During 1918, the Ichneumonids *Anomalon biguttatum*, Gr., *Heteropelma calcator*, Wesm., and *Ichneumon nigritarius*, Grav., destroyed 50, 12 and 10 per cent. respectively of the pupae of *B. piniarius*. The moth is also parasitised by *Carcelia excisa*, Fall.

SCHOYEN (T. H.). *Incurvaria pectinea* (**Hw.**) **som skade-insekt.** [*I. pectinea* as a Pest.]—*Norsk. Ent. Tidsskr.*, i, no. 7, pp. 17–20, 1 fig. Christiania, 1920. [With a Summary in German.] [Received 24th July 1923.]

In 1918 *Incurvaria pectinea*, Hw., was found mining in currant leaves (*Ribes rubrum* and *R. nigrum*). There does not appear any previous record of injury to currants in Scandinavia by this moth.

PAILLOT (A.) & FAURE (J. C.). **Sur le Puceron vert du pêcher.**—*C.R. Acad. Agric. France*, ix, no. 24, pp. 661–665. Paris, 1923.

The green peach aphis [*Myzus persicae*, Sulz.] has been very destructive in the valley of the Rhône and the district of Lyons. The first colonies were found on peaches at the beginning of May, and the infestations increased more and more rapidly until by the 7th June the whole tree was found to be infested. If the Aphids are carefully watched for from the beginning of May, heavy infestations may be prevented by cutting away and destroying any affected leaves. The best spray against this Aphid was found to be one containing 1 lb. pure nicotine, 10 lb. soap and 100 gals. water, and though it proved efficacious against *M. persicae*, it did not materially reduce the numbers of Syrphids and Coccinellids predacious on it. According to the severity of the infestation at least three or four applications should be made at intervals of three to four days.

SPEYER (E. R.). **Notes upon the Habits of Ceylonese Ambrosia-beetles.**—*Bull. Ent. Res.*, xiv, pt. 1, pp. 11–23, 8 figs., 6 plates. London, July 1923.

Notes are given on the habits of the following Scolytids from Ceylon: *Xyleborus fornicatus*, Eich., in tea and *Ricinus communis* (castor-oil plant); *X. compactus*, Eich., in *Cinnamomum camphora* (camphor), tea and coffee; *X. morigerus*, Blandf., in rubber (*Hevea brasiliensis*), etc.; and *X. arquatus*, Samp., in *C. camphora*.

The following were only observed to infest dying plants:—*X. semiopacus*, Eich., in *H. brasiliensis*, and sugar-cane (*Saccharum officinarum*); *X. interjectus*, Blandf., in *H. brasiliensis*, etc.; *X. asperatus*, Blandf.; *X. comptus*, Samp.; *X. perforans*, Wollas., in *H. brasiliensis*; *X. bicolor*, Blandf.; *X. exiguus*, Wlk.; and *X. discolor*, Blandf. Other beetles dealt with are *Crossotarsus minax*, Wlk., in diseased rubber; *C. venustus*, Chap.; *C. saundersi*, Chap.; *Platypus solidus*, Wlk.; *P. lepidus*, Chap.; *P. cupulatus*, Chap.; and *P. uncinatus*, Blandf.

UVAROV (B. P.). **Notes on Locusts of Economic Importance, with some new Data on the Periodicity of Locust Invasion.**—*Bull. Ent. Res.*, xiv, pt. 1, pp. 31–39, 1 fig. London, July 1923.

The paper is a part of the results of the author's revision of the group Cyrtacanthacrini [*R.A.E.*, A, xi, 257] and gives information on some changes in nomenclature and systematics of almost all swarming

locusts of the Old World brought about by that revision. Differences between the Old World *Schistocerca gregaria*, Forsk. (*peregrina*, Ol.), and the South American *S. paranensis*, Burm., are discussed, and the insects are considered to be specifically distinct, all records of *S. gregaria* from the New World being quite unreliable. A solitary phase, ph. *flaviventris*, Burm., of *S. gregaria*, is described and figured, and it is suggested that the periodicity of the invasions of this species is due to the alternation of swarming and solitary phases, as it is in *Locusta migratoria*, L., and *Locustana pardalina*, Wlk. [*R.A.E.*, A, ix, 561]. Similar conditions may exist also in *Nomadacris* (*Schistocerca*) *septemfasciata*, Serv., of which ph. *coangustata*, Luc., is the supposed solitary phase.

GREEN (E. E.). **Observations on the Coccidae of the Madeira Islands.**—*Bull. Ent. Res.*, xiv, pt. 1, pp. 87–97, 8 figs. London, July 1923.

Collections of Coccids made in the Madeira Islands during the winter of 1920–21 have raised the number of species known to occur there to 46, and have revealed the following new species :—*Phenacoccus latipes*, under stones, at roots of grasses ; *P. madeirensis*, on *Hibiscus rosa-sinensis*, *Sida* sp. and *Acalypha* sp. ; *Pseudococcus heterospinus* on roots of grasses ; *P. artemisiae*, on roots of *Artemisia argentea* ; and *Lecanium* (*Saissetia*) *cerei*, described from one individual on *Cereus triangularis*. *Aspidiotus* (*Chrysomphalus*) *pinnulifera* var. *diversicolor*, n., is described from *Phoenix dactylifera* and other plants.

The author's *Ceroplastes tenuitectus*, from the Seychelles, is now recognised to be a synonym of *C. denudatus*, Ckll., from the West Indies and Madeira, and the opportunity is taken to describe *C. circumdatus*, sp. n., on *Triphasia* sp. from British Guiana, this species not having been previously separated from *C. tenuitectus*.

WATERSTON (J.). **Notes on Parasitic Hymenoptera.**—*Bull. Ent. Res.*, xiv, pt. 1, pp. 103–118, 8 figs. London, July 1923.

The species dealt with include *Apanteles opsiphanis*, Schrott., parasitic on *Opsiphanes crameri*, from Paraguay; *Brachymeria annulata*, F., parasitic on *Brassolis sophorae* and *Caligo ilioneus ilioneus*, and *B. incerta*, Cress., on *Brassolis sophorae*, from British Guiana; *Spilochalcis morleyi*, Ashm., on *Brassolis sophorae*, and *Opsiphanes invirae*, from Trinidad and British Guiana; *Anastatus reduvii*, How., on *Brassolis* sp. and *B. isthmia* from Trinidad, a supplementary description of this species being given; *Horismenus opsiphanis*, Schrott., on *Opsiphanes crameri*, probably from Paraguay; and *Telenomus nigrocoxalis*, Ashm., on *Brassolis* sp. from Trinidad.

New species described are the Pteromalid, *Pachyneuron validum*, from California, bred from the Psyllid, *Euphyllura arbuti*, Schwarz; and the Bethylid, *Prorops* (gen. n.) *nasuta*, bred from the Scolytid, *Stephanoderes hampei*, Ferr., and the Calliceratid, *Calliceras dictynna*, from the same host, both from Uganda.

DE PEYERIMHOFF (P.). **Les Coléoptères des Euphorbes dans le Maroc méridional.**—*Bull. Soc. Sci. nat. Maroc*, iii, no. 3–4, pp. 43–63, 2 figs. Rabat, 31st May 1923.

Previous work on the Coleoptera associated with *Euphorbia* plants is reviewed. A list is given of those recorded by Wollaston from the

Atlantic Islands (Madeira and Canaries) but arranged according to their habits under the following three groups, xylophagous, predacious, and commensal.

The Coleoptera collected during 1922 from *Euphorbia* plants in Morocco include several new species: the Staphylinid, *Atheta* (*Hilara*) *repentina*, in dead stems of *Euphorbia beaumierana* and *E. echinus*; the Erotylid, *Diphyllus euphorbiae*, in dead stems of *E. beaumierana*; and the Scolytids, *Aphanarthrum alluaudi*, *A. mairei* and *Cisurgus occidentalis* in dead stems of *E. beaumierana* and *E. echinus*. These Scolytids are xylophagous, whereas *A. repentina* and *D. euphorbiae* are regarded as commensals.

Of all the Coleoptera infesting *Euphorbia*, those of the genus *Aphanarthrum* are the most characteristic and peculiar. The points of differentiation between this and allied genera are described, and a key to the species is given.

Departmental Activities: Entomology.—*Jl. Dept. Agric. Union S. Africa*, vii, no. 1, pp. 8-11. Pretoria, July 1923.

Cotton in the eastern Transvaal has suffered greatly from hopperburn and defoliation following upon infestation by the Jassid, *Chlorita fascialis*. The pest became troublesome during January and February, and by April infestation was almost general and apparently coincident with unusually wet weather. The degree of infestation varied greatly in different localities. Preventive measures seem to be the only means of control. The maintenance of a wide barrier of bare land round the fields has been suggested, but a more economical method would be to plant in this barrier a cultivated crop, such as a belt of tobacco, through which the Jassid cannot reach the cotton from the veldt. It was noticed that Jassids and bollworms rarely occurred together in numbers. *Diparopsis castanea* (Sudan bollworm) and *Heliothis* (*Chloridea*) *obsoleta* (American bollworm) were more prevalent than *Earias insulana* (spiny bollworm). Minor cotton pests included *Dysdercus* sp. (cotton stainers) and *Aphis gossypii*. A new insect that must be regarded as a potential cotton pest is a small beetle, the larvae of which live in the soil around the plants and feed on the roots. The best remedy for cotton pests is clean culture throughout the year, the cleaning up of the land during the winter, and thorough preparation and frequent cultivation during the growing season.

For the black peach aphis [*Anuraphis persicae-niger*] thorough spraying during June and July with 1 part tobacco extract in 80 parts of water should be an effective check. *Chrysomphalus dictyospermi* (Spanish red scale) has recently been found on lemons in the Transvaal.

El piojo blanco de los cafetales. [The White Scale of Coffee Plantations.]—*Bol. Agric. Ind. y Com. Guatemala*, ii, no. 7, pp. 284–286. Guatemala, July 1923.

In some districts of Guatemala *Pseudococcus citri* is a serious pest of coffee. It has numerous natural enemies among which five different Coccinellids have been noticed, but maintains itself owing to the protection afforded it by ants. The best way to eradicate the latter is to use a bait poisoned with sodium arsenate.

PHILLIPS (W. J.) & POOS (F. W.). **The Wheat Strawworm and its Control.**—*U.S. Dept. Agric.*, Farmers' Bull. 1323, 9 pp., 12 figs. Washington, D.C., May 1923.

Harmolita grandis, Riley (wheat strawworm) is an important pest of wheat, sometimes destroying whole fields. There are two complete generations in each year; the first generation kills outright each tiller of wheat it infests; the second generation causes considerable loss in yield to winter wheat and kills outright the tillers of spring wheat that it attacks. The life-history, habits and remedial measures are discussed [*R.A.E.*, A, viii, 76, 207]. Natural enemies that assist in reducing the numbers, but cannot be relied upon to give complete control, include the predacious mite, *Pediculoides ventricosus*, Newp., which destroys the larva in the stem, and the small beetle, *Leptotrachelus dorsalis*, F.; but these unfortunately also devour the parasites, which include the Hymenoptera, *Eupelmus allynii*, French, *Ditropinotus aureoviridis*, Crawf., *Merisus febriculosus*, Gir., *Eridontomerus isosomatis*, Crawf., and *Homoporus chalcidiphagus*, Walsh.

JOHNSON (E.), HOWARD (S. T.) & COAD (B. R.). **Cotton Dusting Machinery.**—*U.S. Dept. Agric.*, Farmers' Bull. 1319, 19 pp., 4 figs. Washington, D.C., May 1923.

This bulletin is a revision of a previous one [*R.A.E.*, A, viii, 302]. It discusses the selection of machinery for the application of calcium arsenate dust according to the characteristics of the farm and the conditions under which it is to be used.

GOSSARD (H. A.). **Codling Worm Life History, correlated Spraying Program.**—*Mthly. Bull. Ohio Agric. Expt. Sta.*, viii, no. 5-6, pp. 73-78, 1 chart. Wooster, Ohio, May–June 1923.

Data regarding the life-history of the codling moth [*Cydia pomonella*, L.], which have been gathered from various localities of Ohio, are here collected and represented in the form of a chart showing the developmental conditions of the different stages of the insect for various periods of the year in certain localities of the State. An effective spraying schedule is given.

CRIDDLE (N.). **The Life Habits of** *Cephus cinctus* **Nort. in Manitoba.**—*Canad. Ent.*, lv, no. 1, pp. 1-4. Orillia, Ont., January 1923. [Received 30th July 1923.]

The infestation by *Cephus cinctus*, Nort., in the Prairie Provinces was particularly severe during 1922. A summary of the life-cycle as it occurred in that year is given. Any plant of the grass family may be chosen for oviposition provided it is in the right state of growth; thus during 1922 plants previously considered to be immune, such as oats, both wild and cultivated, were found to contain eggs. Early sown barley was heavily infested. Though eggs may be laid in these plants, many of them are not suitable for larval development. Mature larvae have never been found in the stems of oats. The high death rate of the larvae in these plants is due to various factors. In oats it appears to be the excessive sap that drowns the larvae.

Though parasites, of which *Microbracon cephi* is the most important, keep this pest under control in grasses, their work is very limited in the grain fields, one reason apparently being the cultivation of the

soil. There are two generations of *M. cephi*, the adults of the first appearing late in June, those of the second early in August. Though there is a certain amount of parasitism in wheat during July, there is no sign of the later generation of parasites. Cutting the crop may be an important factor in the absence of this parasite as it avoids broken or cut straws for oviposition.

Further observations show the absolute necessity of rolling after spring ploughing in order to prevent the emergence of the sawflies. It is best to plough in the autumn as soon as possible after harvest [*cf.* *R.A.E.*, A, x, 389]. During 1922 trap crops of wheat gave very promising results, and the advantage of harvesting before the crop has fully ripened was also demonstrated.

HEINRICH (C.). U.S. Bur. Ent. **On the Synonymy of the Pea Moth.**—*Canad. Ent.*, lv, no. 1, p. 13. Orillia, Ont., January 1923. [Received 30th July 1923.]

The American and European pea moths are now found to be identical, so that *Cydia* (*Laspeyresia*) *novimundi*, Heinrich [*R.A.E.*, A, ix, 100] must be regarded as a synonym of *C.* (*L.*) *nigricana*, Stephens. The error was due to a confusion of the European specimens of *C. nigricana* in the National Museum, which represent two distinct but very closely allied species, *C. nebritana*, Treitsch., and *C. nigricana*, Stephens, both being under the name *nebritana*.

SEAMANS (H. L.). **Forecasting Outbreaks of the Pale Western Cutworm in Alberta.**—*Canad. Ent.*, lv, no. 3, pp. 51–53. Orillia, Ont., March 1923. [Received 30th July 1923.]

Porosagrotis orthogonia, Morr. (pale western cutworm) has been causing serious losses to grain crops in Alberta since 1911. The number of parasites remains fairly uniform each year, though the actual amount of parasitised cutworms varies, this variation being distinctly correlated with the number of days in May and June when the cutworms are forced to the surface by the presence of moisture [*R.A.E.*, A, xi, 363].

While rain is actually falling, parasites are not active, but the two Tachinids, *Bonnetia compta* and *Gonia capitata*, which are the most abundant of the parasites of *P. orthogonia*, lay their eggs on the leaves of vegetation. Their increase is due to the wet weather causing the cutworms to feed on the leaves above ground. Moreover, the direct parasites, both Hymenopterous and Dipterous, which are the chief instruments of control with the common surface-feeding cutworms of various species, become active as soon as the rain is over, and are an important factor in the control of *P. orthogonia* while the larvae are on the surface.

CRAIGHEAD (F. C.). **The Host Selection Principle as advanced by Walsh.**—*Canad. Ent.*, lv, no. 4, pp. 76–79. Orillia, Ont., April 1923. [Received 30th July 1923.]

Since the publication of "Hopkins host-selection principle as related to certain Cerambycid Beetles" [*R.A.E.*, A, x, 83] the author's attention has been drawn to two papers by B. D. Walsh "On Phytophagic Varieties and Phytophagic Species" in *Proceedings of the Entomological Society of Philadelphia*, iii, 1864, pp. 403–430 and

iv, 1865, pp. 194–216. Unfortunately these papers were entirely overlooked. Parts of them are here quoted, and they express practically all the conclusions arrived at by the present author.

FERRIS (G. F.) & HYATT (P.). **The Life History of *Euphyllura arbuti* Schwarz (Hemiptera; Chermidae).**—*Canad. Ent.*, lv, no. 4, pp. 88–92, 1 plate. Orillia, Ont., April 1923. [Received 30th July 1923.]

Various reports have been received during the past years of injury to madrone trees (*Arbutus menziesi*) in the San Francisco Bay region by the Psyllid, *Euphyllura arbuti*, Schwarz. This is apparently its only food-plant, and it probably occurs throughout the range of *A. menziesi* from British Columbia to Southern California and possibly northern Lower California.

The immature stages are entirely enclosed in a cell formed of waxy secretion. They are usually found under the bark scales or any other protected part of the tree, though they may be exposed on leaves or the bark. If disturbed, they may leave the cell and construct another in a different position. The eggs are laid singly or in clusters at the axils of the stems, on petioles, new leaves or in the folds of new growth. They hatch in from 14 to 30 days depending on weather conditions. A large number of eggs are laid by each female, as many as 324 under laboratory conditions. The eggs have been found practically at all times of the year. The various stages are described.

Three Chalcidoid parasites were reared from the nymphs, *Psyllaephagus* sp., *Pachyneuron* [*validum* Watrst.] and *Alloxysta* sp. The percentage of parasitism appears to be fairly high; it is most pronounced in the last nymphal stage.

SEAMANS (H. L.). **The Alfalfa Thrips and Its Effect on Alfalfa Seed Production.**—*Canad. Ent.*, lv, no. 5, pp. 101–105, 1 fig. Orillia, Ont., May 1923.

Although Alberta has the largest consolidated acreage of lucerne in Canada and it is still increasing, most of the seed for new plantings is imported. There are various factors governing seed production, of which only the influence of thrips is here considered. The most prevalent species is *Frankliniella occidentalis*, Perg. During the latter part of the summer, *Haplothrips statices*, Hal., is also present, though not in serious numbers.

The adults of *F. occidentalis* emerge from hibernation early in May when the lucerne plants are about six inches high, and the eggs may be found towards the end of May in the stems, leaves and stipules. By this time the adults have practically disappeared. The eggs are laid in the tissues of the plants and hatch in 6–9 days, depending on weather conditions. The larval period is very variable, lasting from 6 to 14 days. The young thrips mostly remain in unopened buds or at the base of the corolla tube of an open flower. During the past two seasons, there has been an average of seven generations, all of which are so intermingled as to be almost inseparable. Some damage is due to the thrips feeding on the ovaries of the opened flowers or on the young seed pods, but the most severe losses are caused by the great decrease in blossom production due to feeding on unopened buds. Owing to the habits of the insect, it cannot be easily treated

with dusts or sprays, but as the eggs dry up in a few hours after the stem in which they have been deposited is cut, early mowing is recommended. The lucerne should be carefully watched after it is six inches high, a handful of stalks being gathered every two or three days and shaken over a piece of white paper. The number of thrips will be found to increase at first and then suddenly decrease towards the end of May. At this time the lucerne should be cut and used for hay. With proper moisture conditions, the subsequent growth will be very rapid and be well advanced before the thrips are abundant enough to cause appreciable damage.

The Chalcid, *Thripoctenus americensis*, Gir., was found associated with this thrips and may be a parasite of it. The Anthocorid, *Triphleps tristicolor*, Wlsh., and a large thrips, *Aeolothrips fasciatus*, L., are predacious on *F. occidentalis*.

CHAMPLAIN (A. B.) & KNULL (J. N.). **Fragmentary Notes on Forest Coleoptera.**—*Canad. Ent.*, lv, no. 5, pp. 112–115. Orillia, Ont., May 1923.

Notes are given on various beetles found in forests in Pennsylvania, including some Temnochilids and Trogositids that are beneficial.

ISAAC (P. V.). **The Turnip Gall Weevil.** *Ceuthorrhynchus pleurostigma*, **Marsh. (Coleoptera, Curculionidae).**—*Ann. App. Biol.*, x, no. 2, pp. 151–193, 3 plates, 31 figs. Cambridge, July 1923.

This paper is divided into three complete parts dealing respectively with the life-history and bionomics, larval anatomy, and control of *Ceuthorrhynchus pleurostigma*, Marsh.

This weevil has been recorded as a pest in several countries in Europe, and it occurs all over the British Isles. During the present investigations it was found to be the cause of galls in different varieties of *Brassica oleracea*, such as cabbage, cauliflower, kale, broccoli and brussels-sprouts, and of *B. campestris*, such as turnips and swedes. Charlock (*Sinapis arvensis*) is a favourite wild food-plant, and is the only wild crucifer on which galls were found. A description is given of the various stages of *C. pleurostigma*. The adults feed on leaves, tender stems, the bark on the root, young pods and flowers of turnips and cabbages and on the foliage and flowers of charlock, hedge-mustard (*Sisymbrium officinale*) and a plant allied to the water rocket (*Radicula palustris*).

Though two broods follow each other, in time, during the year, they prove to be different races and to come from two distinct lines of parentage, each race producing one generation in the year. The spring race breeds in spring in charlock and passes the winter in the adult stage, whereas the summer race breeds in the summer and autumn in various cruciferous crops. The spring race is apparently of no economic importance, as its activities are entirely confined to charlock.

The adults of the summer race emerge about the beginning of June and feed voraciously for 2–4 weeks, after which they hide in the soil. Feeding is resumed towards the end of August, and the eggs are then laid singly in the bark of the tap root or bulb of succulent healthy plants over six weeks old, the number of eggs in each plant depending on the amount of suitable surface available. In the summer the eggs hatch in about 5–7 days and in the autumn in about

17 days. If laid very late, they may remain throughout the winter in this stage, though they have been known to hatch when 60 or 70 days old during a spell of warm weather. Each larva gives rise to a gall, within which it remains feeding on the cortical tissues. Though the galls are separate, one to each larva, they may occur in clusters and coalesce to some extent. The pupa is found in the soil in the following spring, hibernation occurring in the larval stage inside the gall. The whole larval period lasts about ten weeks without hibernation, and 5–6 months with hibernation. The pupal stage lasts about 3 months in the spring and about 35 days in the summer, the whole period of development amounting to about 4 months when the larva does not hibernate and about 8 months when it has to pass through a winter. Details are also given of the spring brood.

The ordinary garden slug, *Limax maxima*, exercises a slight amount of check on *C. pleurostigma* by feeding on the galls containing the larvae. The larvae of the Hydrophilid, *Helophorus rugosus*, Ol., are also predacious on the larvae within the gall. The Braconid, *Diospilus oleraceus*, Hal., is an active parasite of the larvae, which are also destroyed by birds.

Various soil fumigants have been tested for the control of *C. pleurostigma*; none of them is, however, likely to be efficacious in the field. The treatment of seedlings with hot water also proved a failure. The suggestions of previous authors for the control of this species are briefly reviewed. It is advised that all infested stalks be rooted up as early as possible in the spring and the earth shaken from them. They should then be stacked in large heaps and burnt as soon as they are dry. To destroy the pupae in the cocoons the land should be ploughed deeply immediately the infested crop has been removed. From about the middle of July and through the autumn some immune crop should be grown. All charlock and hedge-mustard should be destroyed.

Cunliffe (N.). **On the relative Importance of certain Common Grasses as Host Plants of** *Oscinella frit*, **Linn.**—*Ann. App. Biol.*, x, no. 2, pp. 210–212. Cambridge, July 1923.

Further experiments concerning the preference shown by *Oscinella frit*, L., for some grasses have proved *Arrhenatherum* spp. to be the most heavily attacked [*R.A.E.*, A, x, 475], followed closely by *Hordeum murinum* and *Agrostis myosuroides*. The flies showed a decided preference for certain grasses over oats, the latter being in great preponderance numerically though more advanced in growth than the grasses. It would appear that either the fly is able to select suitable plants for oviposition, or if oviposition is indiscriminate, the larva in some cases fails to reach maturity for reasons connected with plant morphology or physiology. From experiments with oats planted at different times, the most susceptible period in the early part of the plant-cycle appears to fall between the 19th and 26th day from the date of appearance above soil. No explanation of this variation of susceptibility can as yet be advanced. The intensity of infestation was not inversely related to age, though the period when the main stem was in the most susceptible condition was early in the cycle.

Should all graminaceous food-plants have susceptible periods like oats, different results may be expected from other age associations of the grasses tested, as the position of the susceptible period will not necessarily be the same in the cycles of different species.

FRYER (J. C. F.) & STENTON (R.). **Notes on the Control of "Cutworms" by Poisoned Bait.**—*Ann. App. Biol.*, x, no. 2, pp. 241–252, 3 figs. Cambridge, July 1923.

The poison bait method of controlling cutworms is generally recognised in the United States of America as the standard treatment, but in Britain the records are too scanty to justify any final conclusions. The present experiments were carried out in the laboratory with *Euxoa segetum*, and also in the field. They are described in detail. Though many substances were tried in the laboratory, nothing more attractive than moist bran was found, this being eaten almost as readily as the natural food; and the addition of flavouring materials did not increase its effectiveness. In the experiments in the field 1 lb. of Paris green was used per acre, though in America $\frac{1}{3}$ lb. per acre is considered sufficient. The bait was made of 1 lb. bran to 1 oz. Paris green, the bran being dyed with cochineal so that the larvae that had eaten it could be distinguished. It was fairly effective in the case of mangel and swede fields, one dressing destroying about 45 per cent. of the cutworms. As there is a slight danger of birds eating the poisoned bran, this method can only be recommended under special circumstances. It is desirable, however, that some poison be found that would be sufficiently toxic to the larvae, and, in the quantities used, harmless to birds and other vertebrates.

RUSCHKA (F.). **Ein neuer Holzkäferparasit aus der Tribus Cleonymini Schmiedekn. (Hym. Chalcididae).** [A new Bark-beetle Parasite of the Tribe Cleonymini.]—*Ent. Mitt.*, xii, no. 3–4, pp. 198–201, 9 figs. Berlin, 30th July 1923.

A new Chalcid, *Perniphora robusta*, gen. et sp. n., is described from males bred from alder infested with *Hylecoetus dermestoides*, L., and the following Scolytids, *Xyleborus* (*Anisandrus*) *dispar*, F., *X. saxeseni*, Ratz., *Xyloterus domesticus*, L., and *X. signatus*, F. Some individuals of *Habrilys brevicornis*, Ratz., were bred from the same material.

TRABUT (—). **Le Figuier. Ennemis et Maladies du Figuier.**—*Bull. agric. Algérie-Tunisie-Maroc*, xxix, no. 7, pp. 117–124, 13 figs. Algiers, July 1923.

The insect enemies of the fig-tree include the Scolytid, *Hypoborus ficus*, which attacks only dying branches, constructing parallel galleries under the bark; and the Longicorn, *Hesperophanes griseus*, the larvae of which mine the branches and trunk, sometimes causing the death of the tree. The first branches to be attacked should be cut off and burnt, and dead trees showing signs of infestation should all be burnt. The termite, *Calotermes flavicollis*, is frequently found in the dead wood of fig-trees. The larvae of the moth, *Hemerophila* (*Simaethis*) *nemorana*, attack the leaves, living under a tent on the under-surface of the leaf, but are generally kept in check by natural enemies. The Coccid, *Ceroplastes rusci*, is the most serious enemy of the fig-tree, but its numbers are largely reduced by the Coccinellid, *Chilochorus bipunctatus*, a Chalcid, *Scutellista cyanea* and a Noctuid moth, *Eublemma* (*Thalpochares*) *bipunctata*. Other pests are *Coccus hesperidum*, *Lepidosaphes* (*Mytilaspis*) *ficus*, *Ceratitis capitata*, *Drosophila melanogaster* (*ampelophila*), *Lonchaea aristella* (which lives in caprifigs) and *Myelois*

ceratoniae, which is really a pest of the carob, but also attacks figs in contact with carobs. *Ichneumon ficarius* is a parasite of *Blastophaga*. *Aphelenchus caprifici* is a small Nematode living in the folds of the abdomen of *Blastophaga*, and a species of *Heterodera* infests the roots of the fig causing galls.

FEYTAUD (J.). **L'Arséniate diplombique contre les vers des fruits.**—*C.R. Acad. Agric. France*, ix, no. 25, pp. 673–676. Paris, 1923.

The superiority of diplumbic lead arsenate over triplumbic in the control of the Colorado potato beetle [*Leptinotarsa decemlineata*, Say] has been demonstrated [*R.A.E.*, A, xi, 210], and its properties have been tested [*R.A.E.*, A, xi, 399]. Recent experiments have shown that it is equally valuable against caterpillars attacking grapes, apples and pears, and that it spreads and adheres very well to both foliage and fruit.

BERNARD (C.). **Verslag van een reis naar Zuid-Sumatra ter bestudeering van den Koffiebessenboeboek.** [Report on a Journey to South Sumatra for the Study of the Coffee Berry Borer.]—*Meded. Koffiebessenboeboek-Fonds*, no. 8, pp. 175–188, 1 map. Soerabaya, 1923.

The coffee berry borer [*Stephanoderes hampei*] has spread more slowly in South Sumatra than in Java owing to less intensive traffic. Now that more is known about this pest, unnecessary alarm need not be felt at its appearance in a new district because the measures that have been worked out are capable of keeping the infestation down. This is confirmed by the satisfactory results obtained in very severe cases. Altitude is a natural factor of consequence. Above 3,300 feet the attack develops slowly and can be kept within bounds without difficulty. This has been ascribed to the fact that Java coffee is grown at high altitudes, but the author's observations do not warrant the view that Java coffee is less susceptible than the Robusta variety. The humidity present at high altitudes also militates against the beetle, probably in connection with parasitism by fungi. The measures applicable in Java are not possible in Sumatra. Uniform measures by the European estates are nullified by the numerous native coffee plantations intermingled with them; "rampassen" or radical plucking is useless owing to there not being any definite harvest seasons, and the steeping of berries is not practicable as the native growers have no suitable apparatus. In Sumatra measures must aim at keeping the injury down without adding too much to the cost, and the author recommends a method now practised with success in many estates, viz., the intensive collection of all fallen berries and the plucking of mature berries without delay. The former measure presupposes freedom from weeds and the elimination of cover crops. If the soaking of the harvested berries is out of the question, the containers should be covered so as to prevent the beetles from escaping. Disinfection of baskets, etc., in a solution of creoline, and the destruction of beetles in sweepings by immersion in hot water, should be practised. Where hedges of Leguminosae are absolutely necessary as windbreaks and for improving the soil, care must be taken to prune them from below so as to leave the ground clear.

Rivière (G.) & Pichard (G.). **Les abeilles et la fécondation des fleurs des arbres fruitiers.**—*Jl. Soc. Nat. Hortic. France*, xxiv, pp. 304-306. Paris, June 1923.

Some experiments are described which are considered to prove that bees, although of great value in the fertilisation of certain flowers, are not indispensable in the case of fruit-trees.

Sen (P. C.). **Cotton Leaf-roller.**—*Bengal Agric. Jl.*, iii, no. 1, p. 23, 1 plate. Dacca, March 1923. [Received 31st July 1923.]

The cotton leaf-roller [*Sylepta derogata*] is a serious pest of large-leaved cotton, which it attacks from July to October. It rolls the leaf and then feeds on it, leaving the rolled part for its shelter. The moth lays 250-300 eggs, singly on the lower surface of the leaf, and the young larva feeds on the epidermis for a few days before beginning to roll the leaf. It pupates after 2-5 weeks, outside the leaf, and the adult emerges about a week later. There may be as many as three generations in a season. In cold weather, the full-grown caterpillars hibernate in the fields under some sort of shelter. The rolled leaves containing the caterpillars should be crushed, or put into a vessel with water and a little kerosene. If the infestation is heavy, the crop might be sprayed with lead arsenate.

Ballard (E.). **Further Notes on *Pempheres affinis*, Fst. (The Cotton Stem Weevil).**—*Mem. Dept. Agric. India*, Ent. Ser., vii, no. 12, pp. 243-255, 3 plates, 2 figs., 1 map. Calcutta, February 1923.

Further observations show that *Pempheres affinis*, Fst., cannot be considered one of the more important pests of cotton in India except under exceptional circumstances. It was undoubtedly a more serious pest in 1911-12 than at the present time, and it is possible that both Cambodia and indigenous cotton are becoming immune from or at least resistant to it. The chief loss is caused to seedlings, which almost invariably succumb to attack by *P. affinis*. Some strains of Cambodia cotton are less liable to attack in their early stages than others, and among indigenous varieties *Gossypium indicum* is much less affected than *G. herbaceum*. Work in connection with resistant varieties has been carried out during 1920-21 and will be published elsewhere. The present distribution of *P. affinis* in India is given in a map. Details are also given of its life-history [*cf. R.A.E.*, A, vi, 114] and its habits. As it feeds on a large number of plants other than cotton, a list of which is given, the close season for cotton has proved of little value against this weevil. A small Chalcid has been reared from the larvae, and all stages except the egg are parasitised by a fungus.

Srinivasa Rao (H.). **The Cocoanut Beetle.**—*Jl. Mysore Agric. & Exptl. Union*, v, no. 2, pp. 90-91. Bangalore, 1923.

During further investigations on the coconut beetle [*Oryctes rhinoceros*] in Mysore, filling the holes bored by the beetle with a mixture of sand and salt only acted temporarily as a deterrent. The plan was then tried of filling the holes with sand and salt and inserting a dead beetle into the hole at its entrance in such a manner that it was visible from the outside. This has been done for two or three months, and no fresh beetles have as yet been found entering the old borings.

GOKHALE (V. G.). **Rhinoceros Beetle.**—*Agric. Jl. India*, xviii, pt. 2, pp. 183–184. Calcutta, March 1923.

A method that has proved successful in trapping numbers of *Oryctes rhinoceros* (rhinoceros beetle) in the Bombay Presidency consists of keeping castor-cake rotting in a semi-solid condition in earthern pots at various places in the plantation. The odour attracts the beetles, which, having settled on the baits, die in the pots, from which they are removed from time to time.

Mr. T. Bainbrigge Fletcher, in a note, compares this method to the practice of accumulating heaps of decaying vegetable matter in the palm-groves for the beetles to oviposit in. Sometimes these heaps are inoculated with a fungus that attacks the larvae. The danger of such traps in India is that they are not regularly attended to and thus become foci for breeding.

VITTAL RAO (U.). **Rhinoceros Beetle.**—*Agric. Jl. India*, xviii, pt. 4, pp. 423–424. Calcutta, July 1923.

Owing to the expense of extracting rhinoceros beetles (*Oryctes rhinoceros*) from the crowns of coconut palms by means of hooked needles, the author tried filling the leaf-sheath bases with river sand, working from the tops downwards, alternate palms being treated and the others left as controls. The supply of sand was occasionally replenished as the trees grew. The results showed rather less than half the number of beetles in the sanded trees compared with the untreated ones.

FULMEK (L.). *Chloridea assulta*, **Guen., op tabak in Deli.** [*Heliothis assulta* on Tobacco in Deli.]—*Bull. Deli Proefst.*, no. 18, pp. 3–6, 2 figs. Medan, 1923. (With a summary in German.)

Heliothis (*Chloridea*) *assulta*, Gn., is the chief pest of tobacco in Deli (Sumatra), whereas *H. obsoleta*, hitherto considered the only enemy of tobacco there, is seldom found on this plant; it is common on *Mimosa invisa* and maize. As the larvae of the two species are difficult to distinguish and are subject to considerable variation, it is advisable to breed out the adults in order to identify the caterpillars on a given food-plant.

FULMEK (L.). **De eieren van de voor tabak schadelijke vlinders in Deli.** [The Eggs of the Lepidopterous Pests of Tobacco in Deli.]—*Bull. Deli Proefst.*, no. 18, pp. 6–10, 11 figs. Medan, 1923. (With a summary in German.)

A description is given of the eggs of five moths that infest tobacco in Sumatra, namely, *Heliothis* (*Chloridea*) *assulta*, Gn., *Phytometra signata*, F., *Dausara talliusalis*, Wlk., *Prodenia litura*, F., and *Phthorimaea* (*Gnorimoschema*) *heliopa*, Lw. The eggs of *P. litura* are attacked by Chalcid parasites in spite of the felt-like covering of the egg-mass. *Chelonus bussyi*, Vier., parasitises the eggs of *P. heliopa*.

D'ANGREMOND (A.). **Jaarverslag 1 Mei 1921-30 April 1922.** [Annual Report of the Vorstenland Tobacco Experiment Station from 1st May 1921 to 30th April 1922.]—*Meded. Proefst. Vorst. Tabak*, xlvii, pp. 5–26. Klaten (Java), April 1923. [Received 2nd August 1923.]

Owing to the cleanliness of the packing sheds and to the rapidity with which the shipment of tobacco was effected, no more trouble was experienced from *Lasioderma serricorne*. No infestation of importance by any pest was observed on tobacco in the field.

MEYRICK (E.). **Exotic Microlepidoptera.**—iii, pts. 1 & 2, pp. 1–64. Published by the author, Marlborough, Wilts., June & July 1923. Price 3s. a part.]

The species described include *Meteoristis religiosa*, gen. et sp. n., from larvae boring in aerial roots of *Ficus religiosa* in Bengal, and *Laddia allotriopa*, sp. n., from ripe cotton bolls in Fiji.

JUILLET (A.). **A propos de la note de MM. Chevalier et Mercier sur l'action pharmacodynamique du principe insecticide des fleurs de pyrèthre.**—*C.R. hebdom. Acad. Sci.*, clxxvii, no. 4, pp. 294–296. Paris, 23rd July 1923.

From the results of his own experiments, and those of others, the author is of opinion that the ether extracted from pyrethrum by Chevalier and Mercier [*R.A.E.*, A, xi, 403] is not a simple substance, but a mixture.

GRANDI (G.). **Studi sullo sviluppo postembrionale delle varie razze del** *Bombyx mori*, **L. II. L'evoluzione larvale della razza** *Treotti dello Schensi* **e considerazioni generali.** [Studies on the Post-embryonic Development of the various Strains of *B. mori*. II. The Larval Evolution of the Treotti dello Schensi Strain with General Considerations.]—*Boll. Lab. Zool. gen. & agrar., R. Scuola sup. Agric. Portici*, xvii, pp. 3–40, 9 figs. Portici, 20th June 1923. [Received 1st August 1923.]

The external morphology of the larval stages of this strain of *Bombyx mori* is fully described, and a key to them is given.

MERCET (R. G.). **Adiciones á la fauna española de Encirtidos. 3ª Nota.**—*Bol. R. Soc. Espan. Hist. Nat.*, xxiii, no. 4, pp. 174–179, 3 figs. Madrid, April 1923.

A further description is given of *Aphycus* (*Aphycoides*) *matritensis*, Mercet, a parasite of *Physokermes piceae*, Schr. (*abietis*, Mod.) in Spain and Sweden. [*cf. R.A.E.*, A, xi, 205.]

CHAWNER (E. F.) & PEACOCK (A. D.). **Observations on the Life-histories and Habits of** *Allantus pallipes*, **Spin. and** *Pristiphora pallipes*, **Lep. (Hym. Tenth.).**—*Entomologist*, lvi, nos. 721 & 723, pp. 125–128 & 179–185. London, June & August 1923.

The observations here described were made by the authors independently during 1920 and 1921 in Hampshire and Durham respectively. *Allantus pallipes*, Spin., appears to have three generations a year, here described as the spring, summer and hibernating generations. The duration of the various stages in these generations are for the

incubation period 17, 9 and 11–12 days respectively; for the larval period 33, 25 and 26–31 days; for the period of pupation 18, 20–25 and 174 days; and for the total period from one oviposition to the next 68, 54–59 and 211–217 days. The eggs are inserted deep down between the veins of leaves of *Viola* spp., as many as 15 having been counted on one leaf. The larvae feed chiefly at night, mature but not old leaves being preferred. In captivity they also attacked the stalks, but they could not be induced to feed on gooseberry, although a synonym of this species is *Emphytus grossulariae*, Klug. When fully fed, the larva bores a tunnel into rotten or soft tissue and pupates. Hibernation apparently occurs in the mature larval stage. According to the observations of R. C. L. Perkins, there appear to be more than three generations a year in Devonshire, though late emerging insects from any of the three broods may give the impression of a fourth generation.

Pristiphora pallipes, Lep., occurring on gooseberry, has two summer generations and a hibernating one, the duration of the various periods in these generations respectively being: incubation, 8, 6 and 7-[illegible] days; larval stage, 13, 15 and 22–23 days; pupation, 8 (266 in the case of a lingering female), 9–14 and 209 (male) or 288 (female) days; total period from egg to egg, 29, 30–35 and 238 (male) or 321 (female) days. The cocoons are attached to leaves or placed on the soil or other surface of the breeding-cage.

FRYER (J. C. F.), and others. **Report on the Occurrence of Insect Pests of Crops in England and Wales for the years 1920-1921.** *Minist. Agric. & Fisheries*, Misc. Pubn. no. 39, 40 pp., 2 [illegible] London, 1923.

An outstanding event of July to September 1921 was the outbreak of *Euxoa* (*Agrotis*) *segetum* (turnip moth) and other cutworms. Potatoes and roots were chiefly attacked, and sometimes vegetables and flowering plants such as chrysanthemums. The value of poultry in clearing off the cutworms was found to be great, and several poison baits were tried [*R.A.E.*, A, xi, 463]. Chloropicrin proved useless as a surface dressing, but was more effective when injected into the soil. Judging from weather observations over several years the moths emerge in large numbers every season, and it is mainly weather conditions after midsummer that determine whether there is to be an outbreak of cutworms or not. Fortunately in this respect July is often a cold, damp month.

The damage caused by wireworms and the best methods of treating them have previously been noticed [*R.A.E.*, A, viii, 348]. *Agriotes obscurus* and *A. sputator* were the most injurious, *A. pallidulus*, an allied species, and *A. lineatus* being usually less abundant.

Cereals were also damaged by the beetle, *Lema melanopa*, which has increased in numbers during recent years, but seems to be kept in check by Ichneumonids. *Hylemyia coarctata* (wheat bulb fly) was the most destructive wheat pest of the year, the determining factor in its incidence apparently being the presence of uncovered soil during the latter half of the previous summer [*R.A.E.*, A, ix, [illegible]]. The weather during the period of oviposition presumably regulates to a great extent the abundance of this fly, August apparently being the most important month in this respect. For the reduction of *Oscinella* (*Oscinis*) *frit*, the advantage of sowing oats early has been demonstrated. It is suggested that tests should be made to discover

he most resistant varieties of oats. Seed wheat was frequently found infested with the eelworm, *Tylenchus scandens*, the foliage being distorted in consequence and the growth generally poor and stunted. Root crops suffered more than usual from flea-beetles, and particularly from *Plectroscelis concinna* attacking mangels. *Brevicoryne* (*Aphis*) *brassicae* was injurious to swedes, turnips and cabbages. Other vegetable pests included *Hylemyia antiqua* (*Phorbia cepetorum*) (onion fly) and *Aleurodes brassicae* (cabbage white fly). Apples were greatly damaged by the Capsid, *Plesiocoris rugicollis*, the wide range in date of hatching and irregularity in emergence of this pest making its treatment very difficult. *Anthonomus cinctus* was found both in Kent and Norfolk [*R.A.E.*, A, x. 608]. The case-bearers, *Coleophora nigricella* and *C. anatipenella* attacked fruit, but were satisfactorily controlled by nicotine and soap or nicotine sulphate and soap. *Phaedon cochleariae* (mustard beetle) attacked mustard and turnip seed, but flower beetles (*Meligethes* sp.) were less numerous than usual. Osier willows were attacked by *Phyllodecta vulgatissima* (blue willow beetle), which destroyed whole beds of *Salix viminalis*, and *Galerucella lineola* was found on *S. triandra*.

Further minor pests are recorded in a table showing a total of 232 injurious species occurring during the period under review.

THEOBALD (F. V.). **Aphides on Fruit. 1920 & 1921.**—*Minist. Agric. & Fisheries*, Misc. Pubn. no. 39, pp. 14–20. London, 1923.

Aphis (*Dentatus*) *malifoliae*, Fitch (rosy or leaf-curling apple aphis) was very prevalent in June 1920; nicotine spraying was found to reduce the numbers considerably, even after the leaves had been curled. In 1921 the infestations died down in July, largely owing to Syrphid larvae and Coccinellids, and in 1922 the outbreaks were much less severe. *A. pomi*, DeG. (green apple aphis) was not the cause of much injury; in 1921 few eggs were found on apple but they were numerous on *Crataegus* and *Cotoneaster* in one locality. *A. prunifoliae*, Fitch (leaf and blossom aphis), which is frequently recorded as *A. avenae*, F., migrates from apple, hawthorn and pear to oats and other cereals, while the true *A. avenae*, F., migrates to the bird cherry (*Prunus padi*) and is a synonym of *Siphonaphis* (*A.*) *padi*, L.

Eriosoma lanigerum, Hausm. (woolly aphis) caused many serious outbreaks; the season of 1921 was favourable to it, but the excessive heat undoubtedly checked it during the latter part of the summer. *Lachnus viminalis*, Boy. (giant willow aphis) appeared in large numbers on willows and spread to apple trees in the vicinity, where it bred actively on the apple wood. *Anuraphis* (*Aphis*) *prunina*, Wlk. (leaf-curling plum aphis) was very prevalent in 1920, causing a great reduction in the amount of plum blossom in the following spring. It migrates to forget-me-not (*Myosotis* spp.) and to many Umbelliferae, such as *Helichrysum*, *Achillea*, etc. This is considered to be a distinct species from *Brachycaudus* (*Aphis*) *helichrysi*, Kalt., and from *Rhopalosiphum* (*A.*) *nymphaeae*, L., which is found on water weeds. *Hyalopterus pruni*, F. (mealy plum aphis) was abundant both in 1920 and 1921. Of the currant and gooseberry Aphids, *Capitophorus ribis*, L., *Amphorophora lactucae*, Kalt., and *A. britteni*, Theo., were minor pests, but *Aphis grossulariae*, Kalt., in 1920 caused the greatest damage for many years, and *Eriosoma ulmi*, L. (ribes root aphis) was very prevalent. *Myzus cerasi*, F. (black cherry aphis) did not flourish in the hot dry summer of 1921. *Anuraphis amygdali*, Buckt. (black peach aphis)

damaged peaches both out of doors and under glass, and *Phorodon humuli*, Schr., was numerous on damsons and plums. Strawberries were severely damaged by unidentified Aphids, probably either *Macrosiphum fragariae*, Koch, or *Capitophorus fragariae*, Theo.

Tempel (W.). **Ein Versuch zur Drahtwurmbekämpfung mittels elektrischen Stromes.** [An Attempt to combat Wireworms by Means of Electric Current.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, iii, no. 8, p. 60. Berlin, 1st August 1923.

Various experiments with continuous current at 24, 110 and 220 volts and with alternating current at 20,000 volts have proved the uselessness of this procedure in the case of Elaterid larvae. The wireworms are not at all susceptible, and the resistance offered by the soil militates against this method.

Stellwaag (—). **Der Baumweissling** (*Aporia crataegi*, **L.**) **und seine Bekämpfung.** [*A. crataegi* and its Control.]—*Biol. Reichsanst. Land- u. Forstw.*, Flugblatt 70, 4 pp., 3 figs. Berlin, February 1923. [Received 8th August 1923.]

In Germany *Aporia crataegi*, L., is on the wing in June and July. The eggs are deposited on the foliage of fruit-trees, but berry bushes are avoided. The larvae hatch in about three weeks, but do little damage at this stage, as they soon hibernate in a web. In the spring they begin feeding on the buds and also attack the leaves and flowers. The pupal stage usually occurs in May and lasts about a fortnight. Spraying is almost useless in the case of the young caterpillars on the buds, but older individuals may be checked with a solution of ¼ lb. Urania green and 1½ lb. lime in 25 gals. water. The mature larvae may be shaken off. The winter-nests should be removed and destroyed and it is most important that this should be done before March.

Vayssière (P.). **Les Acridiens en France en 1921 et 1922.**—*Ann. Épiphyties*, ix, no. 2, pp. 73-83. Paris, 1923.

The author considers that all recent outbreaks of grasshoppers and locusts in France are due to native insects and not to invasions from outside.

Calliptamus italicus, L., accompanied by *Oedipoda coerulescens*, L. and *O. miniata*, Pall.,* proved to be very injurious in 1921 in the department of Deux Sèvres, on the chalky plains of the middle and upper Jurassic formation, whereas districts on granites and schists escaped. The crops most affected were cabbages, mangels, potatoes, beans and lucerne. In 1922 the insects appeared in smaller numbers and perished from a fungous disease that was prevalent owing to the wet weather. The same disease exterminated *C. italicus* in some other localities.

A new breeding-ground of *Dociostaurus maroccanus*, Thnbg., has been discovered in Dauphiné, which is unusually far north for this species. Measures against *D. maroccanus* in Bouches-du-Rhône [*R.A.E.*, A, vii, 432; ix, 137, 403] were on a large scale, and the campaign in this locality may be considered completed; the results were obtained by poisoned baits, flame-throwers, and spraying with cresyl in 10-13 per cent. solution, which is effective against larvae of the first three stages though later on the percentage must be raised and this makes the remedy too expensive.

* [The insect is evidently not *O. miniata*, Pall. (= *O. gratiosa*, Serv.), but *O. germanica*, Latr.—*Ed.*]

UVAROV (B. P.). **Quelques problèmes de la biologie des sauterelles.**—*Ann. Épiphyties*, ix, no. 2, pp. 84–108. Paris, 1923.

This is an exhaustive summary of observations and views concerning the bionomics of locusts published in several previous papers by this author [*cf.* *R.A.E.*, A, ix, 561 ; xi, 304, 455, etc.].

FAURE (J. C.). **Observations sur les *Baris* et leurs Parasites.**—*Ann. Épiphyties*, ix, no. 2, pp. 109–120, 4 figs. Paris, 1923.

Several species of weevils of the genus *Baris* live on Cruciferae and particularly on cultivated forms of *Brassica oleracea*, the damage occurring from the end of June onwards. Cabbages have been severely infested in the Lyons district, the species chiefly concerned being *Baris cupirostris*, F., *B. chlorizans*, Germ., and *B. laticollis*, Marsh., the life-history and habits of which have been previously noticed [*R.A.E.*, A, ix, 527 ; xi, 399]. Their parasites include *Bracon variator*, Nees, which is the chief parasite of the two first-named in the Lyons district, and lives as an ectoparasite of the larvae, becoming active in June, *B. baridii*, Marsh., and *Entedon pharnus*, Wlk., which have not, however, been observed in the Lyons district, and others already recorded [*R.A.E.*, A, xi, 399]. An account is given of these parasites and their alternative hosts.

These species of *Baris* were originally pests of wild Cruciferae, which had slenderer stems than the cultivated varieties, and were then more easily reached in their galleries by the parasites. In spite of the better protection afforded by the cultivated food-plant, as many as 35 per cent. of the weevils have been found parasitised in some districts.

HUNTER (W. D.) & COAD (B. R.). **The Boll-weevil Problem.**—*U.S. Dept. Agric.*, Farmers' Bull. 1329, 30 pp., 5 figs. Washington, D.C., June 1923.

The information here given has already been noticed [*R.A.E.*, A, x, 405, etc.]. Attention is also called to the treatments recently advocated in Florida [*R.A.E.*, A, xi, 73].

MCCLINTOCK (J. A.). **Peach Rosette, an Infectious Mosaic.**—*Jl. Agric. Res.*, xxiv, no. 4, pp. 307–315, 10 plates. Washington, D.C., 28th April 1923.

As the mosaic disease of peach trees known as peach rosette frequently develops at a considerable distance from any known source of infection, the indication is that winged insects or birds may be associated with natural transmission of the disease. Various insects are found associated with diseased trees, the most abundant being *Anuraphis persicae-niger*, Smith (black peach aphis). Tests made by removing insects, including several species of beetles and leaf-hoppers, from various parts of infected trees and caging them on healthy peach and plum trees, have all given negative results as regards transmission. *A. persicae-niger* when so, transferred multiplied rapidly, showing that conditions were favourable to it, but in no case did rosette develop as a result. The causal agent of the disease is not therefore readily transferred by the types of insect that are known to transmit mosaic of other plants.

THOMPSON (W. R.). U.S. Bur. Ent. **A Criticism of the "Sequence" Theory of Parasitic Control.**—*Ann. Ent. Soc. Amer.*, xvi, no. 2, pp. 115–128, 2 figs. Columbus, Ohio, June 1923.

According to the sequence theory of parasitic control as stated by W. F. Fiske, no one parasite is capable of effecting the necessary amount of control in an insect that is of the character of the gipsy moth [*Porthetria dispar*, L.] and is capable of a similarly rapid rate of increase when unchecked by parasites; and a sequence of parasites, which will attack the insect in different stages of its development, and all the component members of which will work together in harmony, is absolutely necessary before the best results may be expected.

The author does not consider this theory to be valid as a general theory of parasitic action.

La Defensa Agrícola en el extranjero. Exito de los envíos de insectos auxilares. [The Uruguayan Agricultural Defence in Foreign Countries. Success of the Shipments of Beneficial Insects.]—*Uruguay: Minist. Indust., Defensa Agrícola, Bol. Mens.*, iv, no. 5–6, pp. 57–58. Montevideo, May–June 1923.

Both *Aphelinus mali*, Hald., and *Novius cardinalis*, Muls., have become well established in Uruguay, and shipments of the former have been sent to Italy and Germany to combat *Eriosoma lanigerum*, Hausm., while the latter has been dispatched to Spain for use against *Icerya purchasi*, Mask.

PELUFFO (A. T.). **El "Gorgojo" y la "Polilla" del trigo.** [*Calandra oryzae* and *Sitotroga cerealella.*]—*Uruguay: Minist. Indust., Defensa Agrícola, Bol. Mens.*, iv, no. 5–6, pp. 59–63, 10 figs. Montevideo, May–June 1923.

The rice weevil, *Calandra oryzae*, L., and the grain moth, *Sitotroga cerealella*, Oliv., are among the most important pests of cereals in Uruguay, where their occurrence has been universal in 1923. In some years *S. cerealella* may have four generations a year in Uruguay. From 25–30 days are required from the hatching of the caterpillar to the emergence of the moth. The larval stage of the weevil requires 25–28 days, and the pupal, 8–10.

Seed or Paddy Rice Quarantine. Notice of Quarantine no. 55, with Regulations.—*U.S. Dept. Agric., Fed. Hortic. Bd.*, 3 pp. typescript. Washington, D.C., 17th July 1923.

The importation into the United States of unhusked rice from any foreign country except Mexico (under certain rules and regulations given in detail) is prohibited. This quarantine is effective on and after 1st September 1923; it is directed against certain fungi and unnamed injurious insects.

BRITTON (W. E.). **The Aleyrodidae and Coccidae of Connecticut.**—*Connecticut Geol. & Nat. Hist. Survey*, Bull. 34, pp. 335–382, 4 plates, 4 figs. New Haven, Conn., 1923.

Descriptions are given of the Aleurodids and Coccids occurring in Connecticut with keys to the genera and species.

JARVIS (E.). **Cane Pest Combat and Control.**—*Queensland Agric. Jl.*, xix, pt. 6, pp. 472–474. Brisbane, June 1923.

In further experiments with paradichlorobenzene against [*Lepidoderma*] *albohirtum*, Waterh., ¼ ounce injections were placed 1 foot apart, 2 inches from the stools and 4½ inches deep on each side of the rows. This method might also prove effective against termites.

The digger wasps, *Campsomeris tasmaniensis*, Sauss., and *C. radula*, F., are being sent to Java, where it is hoped they will become established and assist in the control of *Lepidiota stigma*, F., *Leucopholis rorida*, F., and other Scarabaeid grubs attacking sugar-cane and cassava. The Scoliid, *Dielis thoracica*, F., is to be introduced from Java for the control of *Lepidiota frenchi*, Blackb.

JARVIS (H.). **Fruit Fly Investigations.**—*Queensland Agric. Jl.*, xix, pt. 6, pp. 496–498. Brisbane, June 1923.

Experiments are being carried out to ascertain from what depth in the soil the adults of *Dacus ferrugineus* (*tryoni*) will emerge from the pupae; so far none has emerged from a greater depth than 6 inches. During May many pupae were found in the fruit of quinces and late apples; owing to the hardness of these fruits, the larvae mature very slowly and in some cases are forced to pupate in them.

The codling moth [*Cydia pomonella*] has been particularly abundant not only in apples and pears but also in late peaches, plums and quinces.

Tomatos have been attacked by larvae of a Pyralid not yet identified. It generally attacks the flower end of the fruit, preferring late tomatos, and mines in the tissues, avoiding the liquid pulp surrounding the seeds.

FROGGATT (J. L.). **The Banana Beetle Borer—V.**—*Queensland Agric. Jl.*, xix, pt. 6, pp. 523–530, 5 plates. Brisbane, June 1923.

The banana beetle borer [*Cosmopolites sordidus*, Germ.] is undoubtedly on the increase in Queensland, particularly where remedial measures have been neglected. The distribution of banana suckers forms the chief means by which the weevil is spread from one district to another.

Active breeding takes place between March and May, and again between September and November, few eggs being laid in the intermediate months. This allows a considerable time during which cultural methods of control can be effectively employed. Injury to the plants is greater during adverse weather conditions. The eggs are laid separately in small burrows eaten out of the plant about ground level. During the active breeding period the larva hatches in from 6 to 10 days and tunnels into the plant, working gradually into the corm, this being the period of greatest damage. Later it tunnels through the outer part of the bulb, when some of the beginnings of the roots may be cut off or damaged, causing the whole root to die. It pupates just underneath the surface of the bulb, this stage lasting 5–8 days. That the grubs only attack old bulbs and corms has proved a complete fallacy, but unless rendered unsuitable, they form ideal additional breeding-places. The corms should be split into small pieces, and the stem cut lengthways and left exposed to the sun; when thus dried they are of no use to the beetles. Old infested butts should also be removed and destroyed to prevent the grubs migrating from them to the suckers or plants that have grown from them.

No variety of banana plant is immune from the attacks of this pest, nor does there seem to be any difference in the relative severity of its depredations in different varieties.

The usual methods of trapping the beetles with split pieces of banana corm are outlined. Experiments are being made with various poisons applied to these baits, but those in solution have proved very unsatisfactory. Under laboratory conditions some dry powder poisons have given good results, the most satisfactory being Paris green. After the beetles had fed for 18 to 48 hours on the poisoned material, 99·4 per cent. were killed. Sodium arsenite used as a finely ground powder destroyed 92·5 per cent. in an 18 to 54 hours' exposure. The time of year exercises a great influence on the destructive effect of the poison, probably owing to the quiescent habits of the beetle in cooler weather.

The precautions necessary when laying out a fresh plantation in order to prevent or at least reduce infestation are pointed out, and a brief description of the various stages of the borer is given.

GURNEY (W. B.). **Cold Storage as a Control of Fruit Fly.**—*Agric. Gaz. N.S.W.*, xxxiv, pt. 7, p. 528. Sydney, 1st July 1923.

Cold storage has proved an effective method for destroying fruit-fly pupae. In the present experiments oranges, apples, peaches, nectarines and pears were kept in cold storage at 35° F. for 20 days. Further tests are to be made with a view to determining whether temperatures of 38° and 40° F. would be equally effective and whether the length of time may be varied with advantage.

Quarantine Proclamation no. 112.—*Commonwealth of Australia Gaz.* no. 47. Melbourne, 5th July 1923.

The importation into Australia is prohibited of (*a*) all deciduous fruit-trees or parts of them (including the fruit and seeds); and (*b*) all plants or parts of plants of the family Rosaceae (including the fruit and seeds) grown in any country in which *Bacillus amylovorus* (pear blight) exists.

Quarantine Proclamations no. 77 [*R.A.E.*, A, ix, 243] and no. 100 [*R.A.E.*, A, xi, 63] are repealed.

WATT (M. N.). **The Leaf-mining Insects of New Zealand. Part iii—Species belonging to the Genera *Agromyza* (Fallen) and *Phytomyza* (Fallen) (Diptera).**—*Trans. N.Z. Inst.*, liv, pp. 465–489, 4 plates, 34 figs. Wellington, 12th May 1923.

A key is given to the New Zealand species of *Agromyza*, of which nine are described as new, including one new variety. These, as well as a new species of *Phytomyza*, are all recorded as mining in the leaves of native shrubs.

STRAŇÁK (F.). **Pohroma na zelenině, způsobená larvami much.** [Injury to Vegetables by Insect Larvae.]—*Ochrana Rostlin*, iii, pt. 3–4, pp. 17–18, 1 fig. Prague, July 1923.

Injury to vegetables in Czecho-Slovakia was particularly severe during 1923, the more important species concerned being *Phorbia (Chortophila) brassicae*, *Hylemyia antiqua* and *Platyparea poeciloptera* on cabbage, onions and asparagus respectively.

BLATTNÝ (C.). **Třásněnky na obilovinách. (Thripsosa obilovin.)** [Thrips attacking Cereals.]—*Ochrana Rostlin*, iii, pt. 3–4, pp. 20–23. Prague, July 1923.

The species of thrips concerned in Czecho-Slovakia are *Limothrips denticornis*, Halid., on rye, wheat, barley and oats; *Physopus tenuicornis*, Uzel, chiefly on oats, less frequently on rye and barley, and rarely on wheat; *Anthothrips aculeatus*, F., chiefly on rye, but also on wheat; *Aptinothrips rufus*, Gmel., on rye; and *Stenothrips graminis*, Uzel, chiefly on wheat but also on barley and oats.

JUHA (V.). **Kovářík a jeho larva, jakožto škůdci našich kulturních rostlin.** [Wireworms as Pests of cultivated Plants.]—*Ochrana Rostlin*, iii, pt. 3–4, pp. 24–26, 1 fig. Prague, July 1923.

Climatic and general conditions during 1923 appeared to be very favourable to wireworms in Czecho-Slovakia, the species chiefly concerned being *Agriotes ustulatus* and *A. obscurus* on turnips, and *A. lineatus* on cereals. A general account is given of the injury caused by them and the remedial measures recommended, including the use of potatoes as trap crops.

DE AZEVEDO MARQUES (L. A.). **A praga da bananeira no Rio de Janeiro. (Biologia do *Cosmopolites sordidus*, Germar.).** [The Banana Pest in Rio de Janeiro. The Biology of *C. sordidus*.]—*Bol. Minist. Agric. Ind. & Comm.*, xi (1922), no. 5, pp. 109–117, 2 plates. Rio de Janeiro, 1923. [Received 14th August 1923.]

In Brazil the banana, which has hitherto only suffered from minor pests such as the caterpillars of *Caligo eurylochus*, Cram., and the scales, *Aspidiotus destructor*, Sign., *Chrysomphalus aonidum*, L., and *C. personatus*, Comst., has now a dangerous enemy owing to the appearance of the weevil borer, *Cosmopolites sordidus*, Germ. Its various stages and habits are described. The complete life-cycle requires 40 days. The usual measures are advised against it, including injections of carbon bisulphide [*cf. R.A.E.*, A, ii, 255].

General Regulations under the Destructive Insect and Pest Act.—*Canada Gaz.*, 15 pp., Ottawa, 7th July 1923.

These Regulations bring up to date those of 17th July 1917 [*R.A.E.*, A, v, 479], which are hereby rescinded with all amendments.

MITCHENER (A. V.). **Field Crop Insects in Manitoba.**—*Agric. Gaz. Canada*, x, no. 4, pp. 333–336, 2 figs. Ottawa, July–August 1923.

The present outbreak of grasshoppers in Manitoba began almost unnoticed in 1918 and reached its maximum intensity in 1920, since when it has gradually been declining. The species concerned are *Camnula pellucida*, *Melanoplus atlantis*, *M. bivittatus* and *M. femur-rubrum*. Many cereals are attacked, the grasshoppers being most abundant in the older settled areas, though isolated outbreaks occurred also in the newer parts. The seriousness of the infestation has been greatly reduced by the measures undertaken by the Provincial Government, one of the main features of which was the preparation and distribution of poison bait, details of which are given. At the present time Bombyliids and other parasites are playing an important part in the control of grasshoppers.

Over about 12,000 square miles of the southern and western part of the Province spring wheat, including durum, and spring rye are attacked by *Cephus cinctus* (western wheat stem sawfly). This pest has only one generation a year in Manitoba, and its seasonal history under local conditions is described. Fields should be ploughed in the autumn, the stubble being buried six inches deep, and rotation of crops should be practised. The parasites, though active in native grasses, do not attack this pest in grain.

A slight outbreak of *Mayetiola* (*Phytophaga*) *destructor* (Hessian fly) occurred during 1922, the previous outbreaks of importance having occurred in 1899 and 1902. Under favourable conditions in Manitoba there is one full and a second partial brood during the year.

Some damage is also done by cutworms, wireworms, Aphids, etc. The pale western cutworm [*Porosagrotis orthogonia*, Morr.] has not yet proved injurious in Manitoba.

A Parasite of the Corn Borer.—*Agric. Gaz. Canada*, x, no. 4, p. 364. Ottawa, July-August 1923.

Habrobracon brevicornis, the important parasite of the European corn borer [*Pyrausta nubilalis*], is being introduced from the United States into Canada with a view to its establishment in Ontario.

SANDERS (G. E.). **Dusting versus Spraying.**—*15th Ann. Rept. Quebec Soc. Prot. Plants 1922–23*, pp. 34–39. Quebec, 1923.

As the result of much experiment it is concluded that the dusting method will eventually prove more successful and popular than spraying. The low cost of the working and upkeep of a dusting machine, the speed of application, the low-price of dusting materials now produced, and the fact that the average farmer applies a dust more efficiently than a liquid spray, are all factors in favour of this method. Enquiries made from 313 orchards in one season, showed 48·6 per cent. of best grade fruit from dusted orchards, 11·4 per cent. from sprayed orchards and 1·1 per cent. from those that were untreated.

In the season 1922–23 two dusts that cost no more than a liquid spray have been put on the market for the first time; these are brown copper-arsenic dust $4\frac{1}{2}:2$, which is used on apples and contains 18 lb. copper sulphate crystals, 8 lb. calcium arsenate, and 74 lb. hydrated lime, and green copper-arsenic dust 9 : 5, which is used on potatoes and contains 36 lb. copper sulphate crystals, and 5 lb. metallic arsenic in the form of arsenites, or the equivalent of 25 lb. lead arsenate or 20 lb. calcium arsenate per 100 lb., the remainder being made up of hydrated lime.

The employment of nicotine as a dust has progressed to such an extent that it gives much more satisfactory control of sucking insects, apart from Coccids, than spraying. The most successful nicotine dust used in the past season consisted of a total of 6 per cent. of nicotine sulphate or 2·4 per cent. of nicotine. On ground crops the efficiency of nicotine can be increased to almost double by dragging a sheet of 20 ft. over the crops, tying the sheet to the boom, and thus confining the fumes. In 1922 these dusts were effective against pea aphis [*Acyrthosiphon pisi*], potato aphis [*Macrosiphum solanifoliae*], pear psylla [*Psylla pyricola*] and other insects that have been almost unaffected by nicotine dust as previously used and very difficult to control by spraying.

TREHERNE (R. C.). **The Relation of Insects to Vegetable Seed Production.**—*15th Ann. Rept. Quebec Soc. Prot. Plants 1922–23*, pp. 47–59. Quebec, 1923.

This paper discusses the natural function of insects in the pollination of plants, with special reference to the question of seed production in vegetable crops. A study has been made in British Columbia to determine the insects that are mainly instrumental in carrying pollen, to what extent they act as pollen carriers, and what are their powers of flight. The results show that the honey-bee is the most diligent collector of pollen and nectar and also the strongest flier, so that it practically eliminates all other species in this respect.

DUSTAN (A. G.). **The Natural Control of the Green Apple Bug** (*Lygus communis* **var.** *novascotiensis*, **Knight**) **by a new species of** *Empusa*.—*15th Ann. Rept. Quebec Soc. Prot. Plants 1922–23*, pp. 61–66. Quebec, 1923.

In consequence of the damage done by *Lygus communis* var. *novascotiensis*, Knight (green apple bug) in Nova Scotia, the natural enemies of this pest have been studied with a view to increasing their efficiency. The life-history of the bug is described. It was found that it is almost free from predators or parasites, but a fungus, a new species of *Empusa*, is described, which has proved to be the cause of the present rapid diminution in the numbers of the bug and will probably result in its eventual disappearance from the Annapolis Valley. The life-history and development of the fungus is described. It was found impossible to grow it on artificial media in the laboratory, but success was obtained by transferring diseased insects from one orchard to another, and it is hoped by this method to carry the disease to other localities. The best time for transferring the insects is when the abdomen has just ruptured and is actively discharging the fungus spores; they should be collected early in the morning when the dew is on the trees. Infected bugs in the adult stage may often be seen on the larger branches, searching for a convenient place in which to hide and die. These may be captured and transferred to another orchard, when they will shelter under the bark of the trees, where the resting spores of the fungus will survive the winter and lead to primary infection of the young nymphs of the following spring. All those collected should be placed on one heavily infested tree in a central part of the fresh orchard. A third method is to transfer the resting spores to another orchard in the spring, before the blossoms unfold. This is done by gathering the loose pieces of bark, to which they adhere closely, and tacking them to the upper limbs of the trees it is proposed to infect.

SANDERS (G. E.). **Combinations of Dusting and Spraying Materials.**—*15th Ann. Rept. Quebec Soc. Prot. Plants 1922–23*, pp. 70–75. Quebec, 1923.

A brief sketch is given of the possible beneficial or injurious reactions produced by various combinations of copper, sulphur, arsenic and nicotine, from the point of view of their use as dusting or spraying materials.

SANDERS (G. E.). **White Arsenic as an Insecticide.**—*15th Ann. Rept. Quebec Soc. Prot. Plants 1922–23*, pp. 76–79. Quebec, 1923.

The possibilities of white arsenic for dusting directly on to potato vines and for use in baits and in Bordeaux mixture are discussed. Its use for all other purposes involves one or more factory operations before it can be employed, but the author considers that the only satisfactory method of direct use is in baits, especially in view of the great improvements being made in the cost of manufacturing combined arsenicals and in the arsenicals themselves.

HUTCHINGS (C. B.). **Some Biologic Observations on the Bronze Birch Borer** *Agrilus anxius*, **Gory.**—*15th Ann. Rept. Quebec Soc. Prot. Plants 1922–23*, pp. 89–92, 1 plate. Quebec, 1923.

Agrilus anxius, Gory (bronze birch borer) is one of the worst enemies of birches in Canada, where it is widely distributed, and causes the death of many trees [*R.A.E.*, A, x, 578]. It is observed that a cold, late spring will hinder development of the larvae and delay emergence of the adult beetles, while a wet summer produces greater resistance to attack in the tree. Studies in the life-history are described. The beetles fed more readily on the foliage of poplar and willow than on birch. Severe pruning, as a temporary measure, will check their spread; in the case of ornamental trees, it is best to cut down infested trees and burn the trunk and branches early in the spring, before the buds are out. Washes and sprays have been found unsatisfactory. Hymenopterous parasites are the greatest natural controlling factor. The Chalcid, *Phasgonophora sulcata*, Westw., is the most important, and several species of Siricids attack the larvae, which are also destroyed by a number of birds.

TAWSE (W. J.). **Results of Onion Maggot Control Work, 1922.**—*15th Ann. Rept. Quebec Soc. Prot. Plants 1922–23*, pp. 96-101. Quebec, 1923.

The work of controlling *Hylemyia antiqua*, Meig. (*Pegomyia ceparum*, Bch.) was carried on on the same lines as the previous year [*R.A.E.*, A, x, 577]. It was found to be advantageous to increase the quantity of sodium arsenite in the bait to ½ oz. per gallon. The planting of trap-crop onions in the rows where the pans are to be placed proved a very successful measure, as the old bulbs used produced large seed tops, which were very much larger than the seedlings and attracted the adult flies. These trap plants were later pulled up and destroyed, and in all cases the larvae were found infesting the stalk. A large number of eggs were also found on the trap crop, and these would otherwise have been deposited on the young seedlings.

BEAULIEU (G.). **French and English Names for the Common Insects of Quebec.**—*15th Ann. Rept. Quebec Soc. Prot. Plants 1922–23*, pp. 122–126. Quebec, 1923.

A list is given of some 200 of the common insects of Quebec under the English popular names with the equivalent French ones.

Delassus (—). **Le** *Liparis dispar* **en Algérie.**—*Rev. agric. Afr. Nord*, xxi, no. 211, pp. 520–524, 2 figs. Algiers, 17th August 1923.

Porthetria (*Liparis*) *dispar* (gipsy moth) caused an appreciable amount of loss in Algeria in 1923, and may constitute a great menace to the important fruit-growing districts if it is not kept down by systematic treatment. The methods that have proved most successful against it in America are reviewed. In Algeria the moth apparently remains in the same forest regions year after year, only in occasional years becoming of really serious importance. This indicates a normal adequate control by parasites, but the author, in spite of numerous examinations, has failed to find any.

Vayssière (P.). **Un nouveau Coccide (Hem.) de la faune africaine.** —*Bull. Soc. ent. France*, 1923, no. 11–12, pp. 152–155, 2 figs. Paris, 1923.

Phenacoccus peyerimhoffi, sp. n., is described from Algeria on *Juniperus thurifera*.

Trouvelot (B.). **Sur la biologie de** *Megacraspedus dolosellus*, **Zell.**—*Bull. Soc. ent. France*, 1923, no. 11–12, pp. 158–160, 1 fig. Paris, 1923.

Megacraspedus dolosellus, Z., has been causing injury to grain in the vicinity of Rheims. Normally it attacks various wild graminaceous plants, the larvae living in the underground part of the stem. Pupation probably occurs about May, as moths were obtained on the 10th of June. There is probably a second generation in the year, which would pupate in the soil in September. If an infested field under grass is cultivated and sown to wheat, it will be attacked by the spring generation of *M. dolosellus*.

Infestation of wheat is therefore considered to be purely accidental and to be due to faulty crop rotation; it should not be grown immediately after the field has been under grass. It is not thought, however, that this change of food-plant is likely to become permanent, as cereals are not attacked when grown consecutively, and wheat does not possess the subterranean stem apparently necessary for the development of the summer generation.

Biron (M.). **Les combinaisons à base d'arsenic dans le traitement de l'Eudémis et de la Cochylis.**—*Progrès agric. & vitic.*, lxxx, no. 33, pp. 181–182. Montpellier, 19th August 1923.

During the last two years tests have been made in the Rhine Provinces regarding the use of soluble arsenicals against the vine moths [*Clysia ambiguella* and *Polychrosis botrana*]. It was found that the larvae were invariably killed by ingesting these soluble salts, which are undoubtedly the best remedy against larvae of the 2nd and 3rd generations. It is not, however, advisable to use them against the first generation owing to the likelihood of scorching the vines. For this first treatment pyrethrum powder is more suitable.

de Rathsamhausen (J.). **Les maladies des Abeilles.**—*Rev. Zool. agric. & appl.*, xxii, nos. 1, 2, 4 & 5, pp. 23–29, 52–59, 120–126 & 140–142. Bordeaux, January, February, April & May, 1923.

An account is given of contagious and non-contagious diseases of bees and of infections of the hive.

Dufrénoy (J.). **Conséquences de l'infection des Châtaignes par la** *Carpocapsa splendana*.—*Rev. Zool. agric. & appl.*, xxii, no. 5, pp. 143–144, 3 figs. Bordeaux, May 1923.

The larvae of *Cydia* (*Carpocapsa*) *splendana* hatch from eggs laid in the ovary of the chestnut and are then enclosed completely in the fruit, which is still outwardly intact. The first sign of infestation is the hole made by the larva for its emergence, soon after the fruit has fallen. Immediately after the larva has emerged, or even before, the chestnut begins to show signs of fungous infection, and soon afterwards a tuft of sporangia appears at the emergence hole. It is evident that the disease has been introduced by the insect, spores having, in fact, been discovered in the digestive tubes of larvae leaving the chestnuts.

Trouvelot (B.). **Le Tigre du Poirier.**—*Cultures Fruitières*, no. 4, pp. 65–66, 2 figs. Paris, 15th August 1923.

A brief and popular account is given of the pear Tingid [*Stephanitis pyri*, Geoffr.] and the damage it causes to fruit-trees. Insecticides containing nicotine are of most value against this pest; they are best applied in the evening to avoid scorching the trees and should be directed to the lower surface of the leaves.

Hyslop (J. A.). **Summary of Insect Conditions throughout the United States during 1921.**—*U.S. Dept. Agric.*, Bull. 1103, 51 pp., 28 figs. Washington, D.C., July 1922. [Received 21st August 1923.]

The application of the results of the insect pest survey is discussed [*R.A.E.*, A, xi, 335], and an account is given of the insect conditions from September 1920 to September 1921. This arbitrary year has been adopted as most suitable for studies relating to insect activity; outbreaks are undoubtedly predetermined to some extent by the conditions prevailing during the late autumn and early winter of the year preceding the actual outbreak, and culminate before the end of the calendar year in which the outbreak occurs. An arbitrary division of the United States into twelve regions has also been adopted as more convenient than the political units for the study of outbreaks in relation to meteorological conditions. Owing to the extremely fragmentary data on ecological conditions throughout the country at present available the annual summary must necessarily be limited to the few insects that are attracting particular interest in the several States. In the present review the more serious and conspicuous insect pests are: *Heliothis obsoleta*, F. (corn earworm), *Mayetiola* (*Phytophaga*) *destructor*, Say (Hessian fly), *Blissus leucopterus*, Say (chinch bug), *Toxoptera graminum*, Rond. (green bug), *Porosagrotis orthogonia*, Morr. (pale western cutworm), *Hypera* (*Phytonomus*) *postica*, Gyll. (alfalfa weevil), *Celama sorghiella*, Riley (sorghum webworm), *Pyrausta nubilalis*, Hb. (European corn borer), *Pseudaonidia duplex*, Ckll. (camphor scale), *Epilachna corrupta*, Muls. (Mexican bean beetle), *Cylas formicarius*, F. (sweet-potato weevil), *Empoasca mali*, LeB. (potato leaf-hopper), *Hylemyia cilicrura*, Rond. (seed-corn maggot), *Anthonomus grandis*, Boh. (cotton boll weevil), *Platyedra* (*Pectinophora*) *gossypiella*, Saund. (pink bollworm), *Popillia japonica*, Newm. (Japanese beetle), *Stilpnotia salicis*, L. (satin moth), *Porthetria dispar*, L. (gipsy moth), and *Nygmia phaeorrhoea*, Don. (*Euproctis chrysorrhoea*, L.) (brown-tail moth). The geographical distribution and recent spread of these species are indicated on maps.

AINSLIE (G. G.) & CARTWRIGHT (W. B.): **Biology of the Lotus Borer** (*Pyrausta penitalis*, **Grote**).—*U.S. Dept. Agric.*, Bull. 1076, 14 pp., 4 plates. Washington, D.C., July 1922. [Received 21st August 1923.]

In American literature two distinct species have been confused under the name *Pyrausta penitalis*, Grote, one of which *P. ainsliei*, Heinr. (smartweed borer) has recently been described. Owing to this confusion several food-plants have been erroneously attributed to *P. penitalis*, which so far as can be ascertained only feeds on yellow lotus (*Nelumbo lutea*) and Indian lotus (*N. nucifera*) in nature. In the laboratory partly grown larvae taken from lotus completed their growth on leaves of smartweed (*Polygonum pennsylvanicum*), buckwheat (*Fagopyrum fagopyrum*) and dock (*Rumex crispus*). The normal food-plants of *P. ainsliei* are Polygonaceae, but this moth cannot develop on lotus. This suggests that the two species have a common ancestry with Polygonaceae as the food-plants and that *P. penitalis*, having taken to lotus comparatively recently, has not entirely lost its taste for the smartweed family.

It is supposed that the winter is passed by *P. penitalis* in the larval stage. The adults from this generation deposit their eggs about mid-June; the resulting larvae feed on the leaves and enter the young pods for pupation about 1st July, the moths emerging between 7th and 28th July. From this time onwards, the stages overlap considerably. The larvae of the second generation feed on the leaves and pupate in the upper ends of the leaf petioles. The larvae issuing from the eggs laid by the second generation moths survive the winter and constitute the spring generation. The habits of the various stages are described. A description is also given of the egg, as the authors' observations vary slightly from those of Welch [*R.A.E.*, A, viii, 14].

The Tachinid parasites recorded from *P. penitalis* require verification, as it is possible that owing to the confusion of the species they are only parasitic on *P. ainsliei*. During the present observations the Braconid, *Apanteles harti*, Vier., was the most common parasite of *P. penitalis*; it attacks the smaller larvae and completes its life when the host is scarcely more than half grown. An undetermined species of *Microbracon* emerged from the host larvae just before they pupated. *Chalcis ovata*, Say, was reared from the pupae, and the eggs were parasitised by *Trichogramma minutum*, Riley. *Aphiochaeta chaetoneura*, Malloch, and *Elachiptera nigriceps*, Lw., were often found in the empty burrows or feeding on decaying larvae or pupae.

The larvae that had prepared their pupal chambers in the upper end of the petioles of the floating leaves were frequently found eaten out, this being attributed to turtles.

COTTON (R. T.). **Broad-nosed Grain Weevil.**—*U.S. Dept. Agric.*, Bull. 1085, 10 pp., 1 plate. Washington, D.C., July 1922. [Received 21st August 1923.]

Caulophilus latinasus, Say (broad-nosed grain weevil) is widespread in Florida and has now been reported from South Carolina and Georgia, though apparently not yet firmly established in the latter States. It also occurs in Cuba, Jamaica, Porto Rico, Mexico, Guatemala, and Madeira, and is probably common throughout the West Indies, Central and South America. It breeds in maize, chick peas, millets, acorns and avocado seeds, and has occasionally been found in the roots of

dasheen [*Colocasia esculenta*] and in sweet potatoes. The adults feed readily on wheat, barley, wheat flour, ginger and macaroni. They can make short flights in search of food and feed on the grain in the maize fields, laying their eggs in it before it becomes fully hardened. Well developed ears with a tightly fitting husk are entirely immune from attack, as is also all grain of a medium degree of hardness provided it is uninjured. Only cracked, damaged or soft seed can be attacked. The depredations continue in storage, the kernels infested in the field being completely destroyed.

In the breeding experiments from which these notes were made maize was used as the food. In broken and damaged seeds the eggs are generally laid in the germ or the soft starch of the endosperm. The greatest number of eggs laid by one female was 229 over a period of 124 days. Oviposition continues throughout the year, the rate decreasing slightly in the colder weather. At temperatures ranging from 65° to 99° F. with a mean temperature of 81° the eggs hatch in four days; at 34°–88° with a mean temperature of 62° the normal incubation period is from 10 to 14 days. The larva develops more rapidly in the germ than in the soft starch or horny endosperm; it bores straight down into the grain, usually remaining in the soft parts. Pupation takes place in the end of the burrow and lasts about five days during warm weather, but like the other stages is prolonged during cold. The life-cycle from egg to adult is about 52 days. In captivity the adults lived about 152 days, and at a temperature of 60° they survived 55 days without food; during normal warm weather they may live from 5 to 12 days without food.

The larvae are parasitised by *Cercocephala elegans*, West., *Aplastomorpha vandinei*, Tucker, and *Zatropis* sp. *Pediculoides ventricosus*, Newp., attacks the larvae, pupae and eggs.

The standard remedial measures recommended against insect pests of stored grain are applicable to *Caulophilus latinasus*.

WHITE (W. H.). **Nicotine Dust for the Control of the Striped Cucumber Beetle (A Preliminary Report).**—*U.S. Dept. Agric.*, Dept. Circ. 224, 8 pp., 3 figs. Washington, D.C., June 1922. [Received 21st August 1923.]

Details are given of experiments with nicotine dust against *Diabrotica vittata*, F. (striped cucumber beetle) in Virginia. This dust successfully protected young cucumbers, melons and related crops. The methods of preparation and application have already been noticed [*R.A.E.*, A, xi, 369].

BROOKS (F. E.). **Curculios that attack the young Fruits and Shoots of Walnut and Hickory.**—*U.S. Dept. Agric.*, Bull. 1066, 16 pp., 8 plates. Washington, D.C., 21st June 1922. [Received 21st August 1923.]

Conotrachelus juglandis, Lec. (butternut weevil), *C. retentus*, Say (black-walnut weevil), *C. affinis*, Boh. (hickory-nut weevil) and *C. aratus*, Germ.' (hickory-shoot weevil) have at various times been confused under the one species, *C. juglandis*. Though they resemble each other throughout the various stages of their development in appearance, habits and seasonal activities, details of which are given for each species, they have different food-plants and the method of attack varies. An account is also given of the distribution of each species and the nature and extent of the damage it does.

C. juglandis has been recorded from *Juglans cordiformis*, *J. sieboldiana*, *J. cinerea*, *J. regia*, *J. nigra* and *J. mandshurica*. The author has found it extensively on the fruit of native butternut (*J. cinerea*), on the shoots and leaf petioles of the Japanese walnuts (*J. sieboldiana* and *J. cordiformis*), and several beetles on branches of a young tree of *J. cathayensis*. During the present investigations two Dipterous parasites, *Chaetochlorops inquilina*, Coq., and *Cholomyia longipes*, F., were reared from the larvae in West Virginia. Other investigators have recorded *C. inaequipes*, Big., *Metadexia basalis*, G.-T., *Myiophasia aenea*, Wied., and *Sigalphus curculionis*, Fitch, as parasites of this species.

C. retentus apparently only infests black walnut (*J. nigra*) and butternut (*J. cinerea*), its occurrence on red oak and hickory being probably accidental. It is parasitised by *Chaetochlorops inquilina*, *Cholomyia longipes*, *Fannia canicularis*, L., *Triaspis curculionis* var. *rufus*, Riley, and *Thersilochus conotracheli*, Riley. A new species of *Belyta* was also found in the rearing jars with this weevil.

C. affinis apparently confines its attacks to various species of hickory, of which pignut hickory (*Hicoria glabra*) appears to be the preferred food-plant in West Virginia, although the nuts of shagbark hickory (*H. ovata*) are sometimes attacked extensively, and to some extent also those of *H. alba* and *H. minima*. *Cholomyia longipes*, *Myiophasia globosa*, Towns., *Triaspis curculionis* var. *rufus* and a new species of *Microgaster* have been reared from the larvae.

In West Virginia *C. aratus* attacks the shoots of *Hicoria minima*, *H. ovata*, *H. alba*, *H. glabra* and *H. pecan*. The parasites reared from the larvae are *Myiophasia globosa*, *Cholomyia longipes*, *Chaetochlorops inquilina*, and an undetermined species of hairworm.

In isolated trees or plantations infestation by these weevils may be reduced by collecting and destroying the fallen nuts once a week. Experiments with lead arsenate, applied soon after growth starts in the spring, indicate the possibility of reducing injury at least in the case of *C. juglandis* and *C. retentus*. According to a previous author, 1 lb. lead arsenate to 10 U.S. gals. water kills the adults of *C. juglandis*.

SUMMERS (J. N.). **Effect of low Temperature on the Hatching of Gipsy-moth Eggs.**—*U.S. Dept. Agric.*, Bull. 1080, 14 pp. Washington, D.C., 22nd July 1922. [Received 21st August 1923.]

The observations here described cover several years and show that a great proportion of the eggs of *Porthetria dispar*, L. (gipsy moth) are prevented from hatching as a result of exposure to low temperatures in New England. Exposure below −25° F. kills all the eggs, and some in each cluster may be killed by exposures to −15°. Provided the temperature is sufficiently low, 70 per cent. of the clusters may be destroyed, but this condition only obtains in the northern part of the infested area and only during certain years; thus a large proportion of the eggs are prevented from hatching in Maine and New Hampshire and also in restricted localities in central and northern Massachusetts, whereas in the southern and eastern part of this State, the coastal section of New Hampshire, Connecticut and Rhode Island nearly all the eggs hatch even after the coldest winter. A covering of snow will protect the egg clusters from the effect of excessive cold.

The relation of cold to the egg parasites requires further study, but it is thought that in the case of *Anastatus bifasciatus*, Fonsc., though many individuals would be killed in the egg clusters, the proportions amongst the surviving hosts and parasites would not be

materially altered. *Schedius kuvanae*, How., hibernates as an adult, principally in leaves and rubbish on the ground, and in such a position it might be expected to be protected from frosts, but a number of cases have been recorded in which this parasite has been destroyed after a specially severe winter.

CHAPMAN (R. N.). **The Possibility of transmitting a *Calendra* Infestation from Wheat to Macaroni through the Processes of Milling and Manufacturing.**—*Jl. Econ. Ent.*, xvi, no. 4, pp. 341-348, 1 plate. Geneva, N.Y., August 1923.

Macaroni is known to be liable to attack by the same weevils as wheat, and a number of experiments have now been made to determine whether the weevils in wheat pass through the processes of manufacture and thus infest the macaroni, or whether infestation occurs by oviposition on the macaroni itself. The experiments proved that no stage of *Calandra* (*Calendra*) *granaria* (which was chiefly used in the tests) could survive the process of milling the wheat into semolina, from which the macaroni is manufactured. Adult weevils would not oviposit in the semolina, even though left in it until they died. Weevils or eggs, even if present in the semolina, could not survive the process of manufacture into macaroni. Even eggs of *Tribolium confusum* (confused flour beetle), which can probably withstand greater pressure than those of *C. granaria*, were destroyed by the manufacturing process. The macaroni therefore contains no living insects or eggs when it comes from the press, and it has been found that the weevils are introduced into the factory and oviposit on the macaroni while it is drying.

HADLEY (C. H.) & SMITH (L. B.). U.S. Bur. Ent. **Spread of the Japanese Beetle, *Popillia japonica*, Newm.**—*Jl. Econ. Ent.*, xvi, no. 4, pp. 349-353. Geneva, N.Y., August 1923.

Since *Popillia japonica*, Newm. (Japanese beetle) first appeared in New Jersey in 1916, it has spread over an area of 773 square miles, the chief agencies of dispersion being flight in search of food and suitable breeding grounds, wind, storms and waterways. Artificial means of spread include the movement from infested areas of farm products, such as sweet maize; and vehicles and pedestrians are also instrumental in local dispersion. Transport of infested nursery stock is probably the most important means of long distance dispersion, and this is being guarded against by stringent quarantine regulations.

VAN DINE (D. L.). **The Effect of Leaf-hopper Injury on the Sugar content of Grapes.**—*Jl. Econ. Ent.*, xvi, no. 4, pp. 353-357. Geneva, N.Y., August 1923.

Erythroneura comes, Say (grape leaf-hopper) has the effect of lowering the sugar content of grapes, as well as reducing the colour and flavour of the fruit. In the Pennsylvania grape belt along Lake Erie the losses in this respect are considerable. A spray recommended by the Pennsylvania State College consists of ½ U.S. pint 40 per cent. nicotine sulphate to 100 U.S. gals. of water, with either 3 lb. resin fish-oil soap or 10 lb. lime, to be applied to the lower surface of the leaves under strong pressure, when the maximum number of first generation nymph

is on the vines. Twenty-four hours after the spray was applied, the number of nymphs present was reduced by nearly 71½ per cent., and a comparison of sprayed and unsprayed grapes showed an increase of approximately 27·01 per cent. in the sugar content of the sprayed ones.

DUDLEY (J. E., Jr.) & SEARLES (E. M.). U.S. Bur. Ent. **Color Marking of the Striped Cucumber Beetle** (*Diabrotica vittata*, **F.**) **and Preliminary Experiments to determine its Flight.**—*Jl. Econ. Ent.*, xvi, no. 4, pp. 363–368, 1 fig. Geneva, N.Y., August 1923.

Diabrotica vittata, F. (striped cucumber beetle), on account of the direct injury it causes and its rôle in the transmission of bacterial wilt and mosaic, is estimated to cause damage amounting to between £600,000 and £1,000,000 annually in the United States. As the beetles are constantly flying from field to field, remedial measures are rendered particularly difficult. A number of tests have therefore been made to determine the limits of flight of the beetle and its general flight habits. Three lots of beetles, totalling 25,786 individuals, were marked and released. Of these, 49 were recovered after an average interval of 4½ days. They flew an average distance of half a mile, five flying over a mile each. The tests will be continued during 1923.

FULTON (B. B.). **Some Experiments on Poison Baits for the European Earwig.**—*Jl. Econ. Ent.*, xvi, no. 4, pp. 369-376. Geneva, N.Y., August 1923.

Experiments to discover the best poison bait for the European earwig, *Forficula auricularia*, L., have shown that sodium fluoride is equal or superior in toxicity to arsenious oxide, and acts more rapidly. Wheat bran sweetened with molasses is a good bait for all practical purposes, and the addition of amyl acetate does not increase its attractiveness. Oat husks are slightly more attractive than wheat bran; they have adhesive properties that make them a better medium for applications to objects, but not so good a one for scattering over the ground for young earwigs. The addition of glycerine does not lessen the attractiveness of the bait and increases the length of time during which it is effective.

CRAIGHEAD (E. M.). **Emergence Records of the Peach Tree Borer,** *Aegeria exitiosa*, **Say, in Pennsylvania.**—*Jl. Econ. Ent.*, xvi, no. 4, pp. 376–377, 1 plate. Geneva, N.Y., August 1923.

Studies have been made to secure accurate data regarding the emergence of adults of the peach tree borer, *Aegeria exitiosa*, Say, with a view to its successful control by the use of paradichlorobenzene. Wire cages were fixed around 52 trees, and a total of 657 adults was recorded, the first emerging on 26th June in 1921 and on 16th June in 1922. Incidentally, many examples of the parasite, *Microbracon sanninoideae*, Gahan, were obtained and reared, as well as one probably new species and one unidentified. As the last adults emerged on 15th September, it was thought advisable not to begin treatment with paradichlorobenzene before that date. Trees of three years old were treated without injury, using ½ oz. to a tree for a period of two weeks and then promptly removing the mounds. With trees of this age and older, 90 to 99 per cent. control was obtained.

Hawley (I. M.). **Notes on the Insect Pests of Utah.**—*Jl. Econ. Ent.*, xvi, no. 4, pp. 377–379. Geneva, N.Y., August 1923.

Utah is free from many of the common pests of other States owing to its mountain ranges and the large areas of dry, uncultivated land. Among the chief pests are *Loxostege sticticalis*, L. (sugar-beet webworm), which, however, is generally kept in check by parasites; *Pemphigus betae*, Doane (sugar-beet root aphis); *Pegomyia hyoscyami*, Panz. (beet-leaf miner); *Tetanops aldrichi*, Hendel (sugar-beet root-maggot) [*R.A.E.*, A, xi, 78], which caused very little damage in 1922, the ground being so hot and dry that many of the eggs laid on it shrivelled without hatching; *Hulstea undulatella*, Clem. (sugar-beet crown borer), which destroyed as much as 50 per cent. of some crops, the larva working on the crown of the beet and either cutting off the top or injuring it so that it did not develop; *Eutettix tenella*, Baker (beet leaf-hopper), which was more than usually injurious during the summer of 1922; the alfalfa weevil [*Hypera variabilis*, Hbst.] and *Eurymus eurytheme*, Boisd. (alfalfa caterpillar), which were minor pests, though the latter caused considerable loss by feeding on the skins of water melons; and *Bruchophagus funebris*, How. (clover seed Chalcid), which was very destructive to lucerne grown for seed.

The outstanding features of 1922 have been a heavy infestation of corn ear-worm [*Heliothis obsoleta*, F.] in both field and sweet maize in the late summer, and the destruction of newly planted apple orchards by the tree-hopper, *Stictocephala festina*, Say, especially in the vicinity of lucerne or sweet clover. Grasshoppers, and the black or mormon cricket (*Anabrus simplex*, Hald.) have both been more than usually abundant.

Hartley (E. A.). **Parasitism of the European Pine Sawfly,** *Diprion* (*Lophyrus*) *simile*, **Hartig., Hymenoptera, Tenthredinidae, in Pennsylvania.**—*Jl. Econ. Ent.*, xvi, no. 4, pp. 386–388. Geneva, N.Y., August 1923.

Previous records of parasitism of *Diprion simile*, Hartig. (European pine sawfly) in America are quoted. In 1922, in addition to the recognised parasites, *Cryptus lophyri*, Nort., was recorded for the first time from this host in the United States. *Monodontomerus dentipes*, Boh., proved to be one of the most effective checks on *D. simile* in New Jersey and Pennsylvania. Records of parasitism of other hosts by this Chalcid are recorded.

Willard (C. J.). **The Effect of CS_2 on the Germination of Seeds.**—*Jl. Econ. Ent.*, xvi, no. 4, pp. 388–392. Geneva, N.Y., August 1923.

In fumigating seeds with carbon bisulphide, directions are usually given for airing the bin within a short time, to prevent any injury to germination. A number of tests are recorded that indicate that in practice no such aëration of storage places is necessary, unless they are absolutely airtight, which is very seldom the case. There seems to be very little likelihood of injuring grain or any of the seeds used in the experiments, as it required very large doses of the fumigant for a considerable period to have any marked effect on any of those tested. The injury slowly becomes greater as the time and dose increase, but is not in direct proportion to either. Seeds were found to be very

variable in their resistance to injury by this means, even different varieties of the same species being differently affected, perhaps owing to the pigment in the seedcoat. Retarded germination is the first injurious effect of carbon bisulphide. Liquid carbon bisulphide poured on to the seeds in fumigation caused practically no injury to the majority of them.

SHOTWELL (R. L.). **On the Oyster-shell Scale found on Willows at Boulder, Colorado.**—*Jl. Econ. Ent.*, xvi, no. 4, pp. 392–393. Geneva, N.Y., August 1923.

A heavy infestation of *Lepidosaphes ulmi* (oyster shell scale) has recently occurred on willows in Colorado, where it may have been introduced on the feet of birds. A table is given comparing the number of circumgenital pores in the scales found on the willows and in others taken from *Populus* and *Salix* in Italy, and from peach in Florida. Following the lines of Glenn's differentiation [*R.A.E.*, A, viii, 305], the Colorado species would be the greyish-brown or banded form, the Italian ones the yellowish-brown form, and those from Florida the brown or apple form. The indications are that the Colorado form of the scale is therefore not likely to be an enemy of apple.

FROST (S. W.). **An Outbreak of the Apple Flea-weevil.**—*Jl. Econ. Ent.*, xvi, no. 4, p. 394. Geneva, N.Y., August 1923.

An outbreak of *Orchestes pallicornis*, Say (apple flea-weevil) is recorded from West Virginia, the larvae mining the leaves of apple, cherry, elm and alder, and the adults eating holes in the foliage. Pupation occurs in gall-like pockets within the leaves. Adults emerged in the laboratory from 8th to 11th June. The adults have also been known to feed on flowers of *Amelanchier* and on leaves of willow.

KEEN (S. E.). U.S. Bur. Ent. **Note on the Occurrence of *Macrosiphum pisi*, Kalt., on Scotch Broom.**—*Jl. Econ. Ent.*, xvi, no. 4, pp. 394–395. Geneva, N.Y., August 1923.

A search for wild food-plants of *Acyrthosiphon* (*Macrosiphum*) *pisi*, Kalt., has revealed males (alate and apterous), oviparous females and eggs on Scotch broom (*Cytisus scoparius*), which is abundant in Oregon and Washington. Eggs began to hatch on broom on 11th March, the first stem-mothers maturing on 25th April. Alate forms appeared towards the end of the third generation (about 1st June) and in the fourth generation, but they did not leave the broom in appreciable numbers, possibly because there was no vetch (their usual herbaceous food-plant in this region) in the vicinity. Most of the succeeding generations were apterous, the Aphids continuing on broom throughout the summer; and sexual forms first appeared about 18th September. Eggs were found on 23rd September. Viviparous females and sexuales continued on broom during the autumn and disappeared early in December. The Aphids feeding on broom are somewhat smaller and duller green than those on vetch, and will readily transfer to vetch or clover. Reproduction has also occurred and sexuales and eggs have been obtained on lucerne and locust trees (*Robinia*) in the insectary.

BRITTON (W. E.). **Swarms of Aphids.**—*Jl. Econ. Ent.*, xvi, no. 4, p. 395. Geneva, N.Y., August 1923.

Swarms of Aphids were recorded from various parts of Connecticut in mid-June, vehicles and pedestrians in some of the towns being covered with them. It is not certain that they were all of one species, but those identified were *Euceraphis deducta*, Baker, which lives on birch, the swarms recorded probably coming from *Betula populifolia*, which is abundant round many cities in Connecticut.

SNAPP (O. I.) & ALDEN (C. H.). U.S. Bur. Ent. **A Note on the Life-history of the San José Scale** (*Aspidiotus perniciosus*) **in the South.**—*Jl. Econ. Ent.*, xvi, no. 4, pp. 395–396. Geneva, N.Y., August 1923.

It has been generally believed that *Aspidiotus perniciosus* (San José scale) passes the winter in a half-grown condition. While this is probably true in the northern States, all stages of the scale have been observed each month during the winter in the south, and it is evident that in the latitude of the Gulf States it breeds almost continuously during a mild winter, and its increase during such years is remarkably rapid, unless it is checked by sprays.

METCALF (Z. P.). **The Green June Beetle** (*Cotinis nitida*, **L.**) **as a Tobacco Pest.**—*Jl. Econ. Ent.*, xvi, no. 4, p. 396. Geneva, N.Y., August 1923.

Although a well-known insect, *Allorrhina* (*Cotinis*) *nitida*, L. (green June beetle) does not seem to have been previously recorded as a tobacco pest. In North Carolina, however, and probably in other parts of the southern United States, it is a common and serious pest of this crop, the beds offering ideal conditions for breeding, as they are always in new ground or in rich soil heavily fertilised with stable manure. The roots of the plants are disturbed and sometimes destroyed by the tunnelling of the pest. The best remedy would be to change the site of the bed each year, or, if this is impossible, the bed should be thoroughly dug over early in September and the soil sterilised with steam or sprayed with kerosene emulsion.

CORY (E. N.). **Experiments on the Control of the Woolly Aphis.**—*Maryland Agric. Expt. Sta.*, Bull. 252, pp. 25–36, 5 tables. College Park, Md., February 1923.

Following the preliminary work on the woolly aphis [*Eriosoma lanigerum*] on orchard trees [*R.A.E.*, A, iii, 446], experiments were begun in 1916 and completed in 1919 to test the effectiveness of pine tar creosote emulsion, and to ascertain the minimum strength practicable to kill the Aphids without injury to the plants. As there has been no opportunity to prosecute the work further, the data are now published.

The best results were obtained with 5 and 8 per cent. strengths. No trees were killed, the percentage of trees freed from Aphids was about 72 and 77 respectively and the percentage of trees making good or excellent growth was about 62 and 55 respectively. At strengths of 15 and 20 per cent. about 25 and 15 per cent. of the trees respectively were damaged, but a higher percentage of trees was freed from Aphids. The percentage of trees making good growth was only about 50 and

27 respectively. The smallness of the percentage of trees that made good growth after being sprayed with the 5 and 8 per cent. strengths was largely due to the poor character of the soil. Any strength of pine tar oils held in close contact with nursery trees by poorly drained earth is likely to cause injury to the roots. The 8 per cent. solution applied twice a year seems to offer the best promise with a minimum chance of tree injury. Repetition of the two applications a year for three years caused a considerable amount of injury.

CORY (E. N.). **The Insects of 1922.**—*Rept. Maryland Agric. Soc.*, vii (1922), pp. 240–247. College Park, Md., 1923. [Received 27th August 1923.]

Paratetranychus pilosus (European red mite) now occurs nearly all over Maryland. Two years' observations in a heavily infested orchard show this mite to be capable of tremendous multiplication, especially in the hot dry weather of June–August. Lime-sulphur sprays in the growing season will reduce the number of mites, but the injured foliage is so susceptible to spray injury that it is doubtful whether the cure is better than the disease. During the dormant seasons thorough spraying with miscible oil will kill almost all the eggs. Tests with scalecide and Schnarr's insecticide gave excellent results. The latter consists of 4 lb. potash fish-oil soap, 4 U.S. gals. red engine or diamond paraffin oil and 2 U.S. gals. soft water. These should be heated together in a kettle till the scum disappears, and the mixture then pumped back into itself with a hand pump. Six gals. is then added to 194 gals. of water for a 2 per cent. emulsion. This strength is effective against San José scale [*Aspidiotus perniciosus*]. Hard water should be softened with 1 lb. sodium carbonate or lye to 100 U.S. gals. prior to making up the emulsion. The cost of this is about half that of commercial lime-sulphur. The only drawback to oil sprays for mites is the necessity for a delayed dormant spray of lime-sulphur to control fungi.

Anuraphis (*Aphis*) *persicae-niger*, Perg. (black peach aphis) may be controlled with paradichlorobenzene. In a badly infested orchard ½ oz. was applied to every three-year-old tree, the earth being dug away to form a shallow depression and the material in this trench covered with several inches of soil. A newly planted orchard that was heavily infested, when so treated, showed no injury, and at the beginning of the next year no signs of the pest.

AINSLIE (G. G.). U.S. Bur. Ent. **Striped Sod Worm,** *Crambus mutabilis*, **Clemens.**—*Jl. Agric. Res.*, xxiv, no. 5, pp. 399–414, 2 figs., 2 pls. Washington, D.C., 5th May 1923. [Received 27th August 1923.]

This paper includes a summary of previously published facts concerning *Crambus mutabilis*, Clemens, with the results of the author's studies for several years. Descriptions are given of the various stages, the systematic history and geographical distribution of the moth. It is apparently purely a North American species and is widespread over the eastern half of the United States. All its food-plants belong to the Gramineae. In the field larvae have been taken on blue grass [*Poa pratensis*], maize, wheat and timothy [*Phleum pratense*]. In cages they have been reared on crab grass (*Syntherisma sanguinalis*), barley and rye; but though in the later stages the larvae fed freely on oats and orchard grass (*Dactylis glomeratus*), none was reared on these alone.

The date of appearance of the first moths in the spring varies in different regions; in Tennessee they were found on 15th May, whereas in Florida they appeared as early as the latter half of February.

In the laboratory the total life-cycle from egg to egg was 58 days in the summer, and it is concluded that normally there are three generations a year in Tennessee, some of the second and all of the third generation overwintering as larvae. Further north it is possible that the third generation completely disappears.

In the summer the eggs hatch in from 5 to 7 days. The newly hatched larva feeds by cutting small pits between the vascular bundles on the upper surface of the leaf blade, usually towards the base; eventually the entire thickness of the leaf is eaten, and when the larva becomes too large to remain sheltered on the leaf blade, it descends to the ground and constructs a burrow lined with silk and with an opening at the surface close beside the stem. Almost all the feeding still takes place above ground. Should the green leaves be insufficient, the main stem of the plant may be attacked. Only the larvae of the first generation attack maize, and then usually only when it is very small. In grassland the injury is less characteristic. Pupation occurs in the soil.

Although there is no record of a general outbreak of this moth, it is certain that under favourable conditions severe but local outbreaks occur more often than is realised. In the author's experience larvae have been found in numerous instances destroying maize plants, but almost invariably the crop had followed grass or the injury was confined to the edge of the field.

C. mutabilis is particularly subject to attack by diseases and parasites. A bacterial disease appeared to be widespread both in the field and laboratory amongst the larvae, its effect being very rapid. The larvae were also attacked by *Isaria* sp.

The parasites reared from the larvae are the Tachinids, *Phorocera claripennis*, Macq., and *Exorista nigripalpis*, Towns.; and the Braconids, *Apanteles crambi*, Weed, and *Macrocentrus crambivorus*, Vier.

In order to prevent injury by *C. mutabilis*, grassland intended for crops should be ploughed in late July or August, so as to reduce the food supply of the autumn generation and to force the larvae to hibernate in an undernourished and incompletely protected condition. In the case of lands permanently under grass, such as meadows and lawns, the growth of the grass should be stimulated by quick-acting fertilisers, such as nitrate of soda. Upon further trial, it is possible that poison bran bait may prove effective under such circumstances.

AINSLIE (G. G.). U.S. Bur. Ent. **Silver-striped Webworm,** *Crambus praefectellus,* **Zincken.**—*Jl. Agric. Res.*, xxiv, no. 5, pp. 415-425, 1 pl., 2 figs. Washington, D.C., 5th May 1923. [Received 27th August 1923.]

Crambus praefectellus, Zinck., apparently only occurs in the eastern half of the United States; a list is given of the States from which it has been recorded together with the first and last dates of collections made in them.

Though it cannot be regarded as a serious pest, it may cause considerable damage under certain conditions [*cf. R.A.E.*, A, viii, 311]. In the rearing cages the larvae readily fed on maize, wheat, rye, oats, blue grass (*Poa pratensis*), pigeon grass (*Setaria glauca*) and timothy (*Phleum pratense*), and this list could doubtlessly be extended almost indefinitely. The larvae probably also feed on plants other than grasses.

The life-history and habits of this moth are very similar to those of *C. mutabilis* [see above], though its seasonal occurrence appears to differ slightly, *C. praefectellus* being the first species of the genus to appear in the spring.

The best measure for preventing infestation of maize where this crop follows grassland would probably be ploughing as early as possible in the autumn and delaying planting as long as possible in the spring. In the meanwhile, the ground being free from weeds and grass, there should be little possibility of the larvae surviving until the maize has germinated. If the infestation is not discovered until the maize is up, it is best to replant alternately with the old rows, leaving the latter in the ground as long as possible.

DA COSTA LIMA (A.). **Sobre um piolho da Lixia.** [A Scale infesting the Litchi Tree.]—*Chacaras e Quintaes*, xxviii, no. 1, pp. 9–10, 1 fig. S. Paulo, 15th July 1923.

The litchi tree [*Nephelium litchi*] in Brazil is infested by a scale, apparently *Fiorinia* (*Adiscofiorinia*) *nephelii*, Mask., originally described from *Nephelium longana*. It is suggested that *Diaspis euphoriae*, Lindm., described from the same plant, may perhaps be a synonym of it. A kerosene soap emulsion spray is advised against the pest.

Insectos nocivos á canna de assucar. O pão de gallinha e seus habitos. [Insects injurious to Sugar-cane. The White Grub and its Habits.]—*Brasil Agricola*, x, no. 102, n.p. Rio de Janeiro, June 1923.

The grubs of *Ligyrus fossator* and *Podalgus humilis* infest sugar-cane in the northern States of Brazil. The larvae of the former need more moisture than those of the latter, and are found chiefly in the lower ground in valleys. The larval life of both beetles lasts about twenty months.

BONDAR (G.). **Aleyrodideos do Brasil.** [Brazilian Aleurodidae.]—*Secret. Agric., Ind. & Obras Publicas da Bahia, Secção Patol. Veg.*, v + 183 pp., 84 figs. Bahia, 1923.

This monograph contains a description of the morphology of ALEURODIDAE, a key to the three subfamilies, UDAMOSELINAE, ALEURODICINAE and ALEURODINAE, and descriptions of the various genera and species found in Brazil.

The new species described are *Radialeurodicus* (gen. n.) *cinereus* from coconut; *R. octifer* from *Inga* and *Cecropia*; *R. bakeri* from *Cecropia*; *R. assymmetrus* from coconut; *Quaintancius*, gen. n., for *Dialeurodicus pulcherrimus*, Quaint. & Baker; *Q. rubrus* from coconut; *Bakerius*, gen. n., for *Aleurodicus conspurcatus*, Enderl.; *B. phrygilanthi* from *Phrygilanthus* sp.; *B. attenuatus* from Rubiaceae, including *Chomelia oligantha*; *Leonardius loranthi* from a Loranthaceous parasite of cacao; *Dialeurodicus similis* from *Eugenia* sp.; *D. cornutus* from *Miconia*; *D. niger* from *Psidium araça*, *Eugenia*, etc.; *D. frontalis* from a Lauraceous tree; *Aleurodicus capiangae*; *A. fucatus* from cacao, *Cecropia*, etc.; *A. linguosus* from *Moquilea tomentosa*, etc.; *A. juleikae* from *Phrygilanthus*; *Metaleurodicus stelliferus* from a Meliaceous plant; *Hexaleurodicus* (gen. n.) *jaciae*, from *Chomelia*, *Miconia* and orange; *Pentaleurodicus*, gen. n., for *Aleuronudus induratus*, Hemp., and for *Pseudaleurodicus bahiensis*, Hemp.; *Paraleurodes singularis* from

orange, etc.; *P. pulverans* from coconut, *Chomelia oligantha*, etc.; *P. crateraformans* from coconut, cacao, etc.; *Dialeurodes maculipennis* from *Ficus* sp.; *D. platicus* from *Psidium* sp., etc.; *D. heterocera* from *Eugenia* sp.; *D. imperialis* from a forest tree; *Aleuroplatus denticulatus* from *Ficus* sp.; *A. intergellus* from *Achras sapota*; *Dialeurodoides auricolor* from a Rubiaceous plant; *Aleuroglandulus subtilis* from *Chomelia oligantha*; *Bemisia tuberculata* from cassava; *Aleurodes insignis* from *Persea gratissima*; *Neoaleurodes* (gen. n.) *clandestinus*; *Aleurotulus mundururu* from *Miconia*; *Aleurotrachelus myrtifolii*; *A. theobromae* from cacao; *A. cecropiae* from *Cecropia adenops*; *A. socialis* from Lauraceae; *A. ingafolii* from *Inga*; *A. rubromaculatus* from a Composite; *A. rosarius* from *Psidium guayava*, *A. camamuensis* from an unidentified tree; *A. cacaorum* and *A. granosus* from cacao; *Aleurocerus* (gen. n.) *luxuriosus* from *Moquilea tomentosa* and a Myrtaceous plant; *A. tumidosus* from a climbing plant; *A. flavomarginatus* from a forest tree; *Aleurothrixus proximans* from a laurel; *A. solani* from Solanaceae; *A. ondinae*; *A. myrtacei* from Myrtaceae; *Asterochiton manihoti* from cassava; and *A. dubiosus* from *Psidium guayava*.

The larva attributed by Goeldi to *Paraleurodes* (*Aleurodes*) *goyabae*, Goeldi, is referred to *Aleurothrixus floccosus*, Mask.

Heidema (J.). **Voorkoming van de schade der made van de wortelvlieg aan gele en roode penen.** [The Prevention of Injury to Yellow and Red Carrots by the Larva of the Carrot Fly.]—*Tijdschr. Plantenziekten*, xxix, no. 5, p. 81. Wageningen, May 1923.

Dutch carrot growers find that injury by the carrot fly, *Psila rosae*, Mg., may be prevented by planting onions or shallots among the carrots.

Aulló y Costilla (M.). **Conferencias sobre Entomología Forestal dadas en la Facultad de Ciencias de la Universidad Central y Academia de Ciencias de Zaragoza. Marzo y Abril de 1923. (Extensión y distribución de las plagas forestales en la Península. Los lepidópteros perjudiciales a los bosques. Los escolítidos y sus daños.** [Lectures on Forest Entomology given at the Faculty of Sciences of the Central University and Academy of Sciences of Saragossa. March and April 1923. (The Spread and Distribution of Forest Pests in the Peninsula. Lepidoptera injurious to Forests. Scolytids and the Injuries done by them.)]—46 pp., 1 map. Madrid, 1923.

The information contained in these addresses is substantially the same as has been noticed already [*R.A.E.*, A, vii, 89, 209; xi, 98, 99, 327].

Malenotti (E.). **La lotta contro l'***Icerya purchasi*. [Work against *I. purchasi*.]—*Riv. Agric.*, xxviii, no. 33, pp. 520–521. Rome, 17th August 1923.

In view of the threatened increase of *Icerya purchasi* in Italy, directions are given on the method of utilising the Coccinellid, *Novius cardinalis* against it.

THEOBALD (F. V.) & WALTON (C. L.). **A Preliminary List of the Aphididae of North Wales with Descriptions of four New Species.**—Separate from *Ann. Rept. Lancs. & Cheshire Ent. Soc. 1921 & 1922*, 13 pp., 2 figs. Southport [n.d.]. [Received 31st August 1923.]

The new species included in this list are *Rhopalosiphoninus waltoni* on ivy (*Hedera helix*); *Aphis reticulata* on globe artichoke (*Cynara scolymus*[?]); *Macrosiphum hellebori* on *Helleborus foetidus* and winter aconite (*Eranthis*); and *M. epilobiellum* on willow herb (*Epilobium montanum* and *Epilobium* sp.).

FEYTAUD (J.). **Un " indésirable " : le Doryphore.**—*Rev. Zool. agric. & appl.*, xxii, no. 4, pp. 97–101, 1 fig. Bordeaux, April 1923.

The author considers that it is quite possible to eliminate fresh centres of infestation by *Leptinotarsa decemlineata*, Say (Colorado potato beetle) as they arise, but the original outbreak in France had become too firmly established before its discovery, and in this zone the pest can only be kept in check by constant campaigns against it.

RILEY (C.). **Comment le Doryphore envahit l'Amérique. (Extrait du Mémoire publié par Charles Riley en 1876.)**—*Rev. Zool. agric. & appl.*, xxii, no. 4, pp. 101–111, 1 map. Bordeaux, April 1923.

These extracts from a memoir, written in 1876, describe the discovery of *Leptinotarsa decemlineata*, Say (Colorado potato beetle) in America.

VOUKASSOVITCH (P.). **La Polyphagie chez la Pyrale de la Vigne** (*Oenophthira pilleriana*, **Schiff.**).—*Rev. Zool. agric. & appl.*, xxii, nos. 2 & 4, pp. 44–52 & 111–120. Bordeaux, February & April 1923.

The food-plants of *Sparganothis* (*Oenophthira*) *pilleriana* have been found to include many low-growing or herbaceous plants, brambles and weeds, and certain field crops (lucerne, clover, etc.), as well as trees and shrubs. The numerous plants that proved unattractive are listed.

Décrets et arrêtés nouveaux concernant le Doryphore.—*Rev. Zool. agric. & appl.*, xxii, no. 4, pp. 126–128. Bordeaux, April 1923.

The legislation recently passed to deal with the outbreak of the Colorado potato beetle [*Leptinotarsa decemlineata*, Say] in France [*cf. R.A.E.*, A, xi, 218] is quoted.

BOUCLIER-MAURIN (H.). **Le Sphinx "** *Deilephila lineata* **" et ses parasites dans le région de Mascara.**—*Rev. agric. Afr. Nord*, xxi, no. 212, pp. 541–542. Algiers, 24th August 1923.

An outbreak of the caterpillars of *Deilephila lineata* occurred during June 1923 in the vineyards near Mascara. From these larvae a Hymenopterous parasite, not yet determined, and a Tachinid, *Erycia girovaga*, Rond., have been reared.

Departmental Activities: Entomology.—*Jl. Dept. Agric. Union South Africa*, vii, no. 2, pp. 102–104. Pretoria, August 1923.

Experiments were carried out in 1922–23 to devise a method of producing a smoke barrage against winged locusts. The resulting formula consists of 30 parts saltpetre, 12 parts sulphur, 8 parts borax and 25 parts coal tar. The first three should be in a fine powder, or should first be ground and thoroughly mixed, then added to the tar (warmed if necessary) and all thoroughly mixed. A deep tin should be filled three-quarters full of the tar mixture, and on the top of this should be placed a layer about ¼ inch deep of a priming mixture of saltpetre, sulphur and borax mixture as above, 2 parts, and sugar, fine white, 1 part. In compounding the priming mixture the saltpetre should be thoroughly dry, and the mixture should be kept dry. In the centre of the priming composition a pinch of chlorate of potash, finely powdered, should be sprinkled to enable the mixture to be ignited easily. A few strings of cordite or gunpowder out of a cartridge could also be used for this purpose. As the priming composition is ignited a lid of some sort can be put over the tin loosely. The mixture should burn fiercely and in 30 seconds a dense smoke should be produced; an ordinary jam tin holding about 1 lb. of mixture will burn for about 12 minutes. If the mixture bursts into flames, a few handfuls of sand will stifle them, and there is no likelihood of it being extinguished when once fully ignited.

Van der Merwe (C. P.). **The Citrus Psylla** (*Trioza merwei*, **Pettey**).—*Jl. Dept. Agric. Union South Africa*, vii, no. 2, pp. 135-141. Pretoria, August 1923.

Conspicuous pitting and curling of citrus leaves is caused by *Trioza merwei*, Pettey (citrus psylla) [*R.A.E.*, A, xi, 355]. It is usually more important to the nurseryman than the fruitgrower, as the immature foliage only is attacked, and this spoils the appearance of trees for sale. A small open gall is produced on the leaf, which curls up when badly infested, and the attack is confined to the lower surface. When attacks are severe there is a distinct yellowing of the young foliage, but when the insects go the leaves resume their normal colour but not their shape. Such distorted leaves appear to function in a natural manner, and in no case have leaves been seen to fall or die as the result of infestation.

This Psyllid has been recorded from Southern Rhodesia and Uganda. It has been observed on citrus trees in all four Provinces of the Union, and it is not thought that any variety will prove immune. Some native trees of the same order (Rutaceae) have been found infested, and are probably among the original food-plants.

All stages of the development of *T. merwei* are described. The eggs are laid at the tips of the shoots on the youngest growth, usually on the edge of the leaf, the lower surface being usually preferred. They may also be laid on the upper part of the stem, where it is soft and tender. They hatch in 5–7 days in summer and 11 in winter. On hatching, the nymph usually settles on the lower surface of the leaf, rarely on the upper. Once settled it remains in one place, and on this site a pit forms, which increases in size as the nymph grows, though it never encloses the insect. Curling does not take place when there is only a moderate number of insects on a leaf. The insect moults five times, and the period spent in each stage is quite irregular. The nymphal period in the summer is on an average about 20 days, and in winter 30. The adult can presumably fly or drift with the wind for long distances.

In warm weather it is very active, but is sluggish at 55° F. The longest period of adult life observed was 31 days in a tube and 36 elsewhere. Egg-laying usually begins 5–7 days after emergence; the largest number of eggs obtained from one female was 815, the average being 311, though this is probably greater on the tree.

Natural enemies of the adults are spiders and small red mites, and the larvae are attacked by at least two species of Syrphid flies, though apparently none of these is of much importance. A more important enemy is a small black Chalcid; 75 per cent. of the more advanced nymphs have been found parasitised by it. At Durban the hot summer days cause a great mortality among the young nymphs.

This Psyllid did serious damage at the end of 1921 in the Eastern Transvaal, and was the cause of a heavy fall of the blossom.

Expensive remedial measures are not recommended. Native food-plants near a citrus orchard should be removed. Infested shoots should be pinched off at the beginning of an outbreak. Spraying against this pest alone is not profitable. Only the younger nymphs can be dealt with by sprays, which would have to be applied before the leaves curl, and before the third moult, which takes place 8-14 days after hatching. This entails spraying about every 8 days as long as the adults are depositing eggs, and they are known to live at least a month. In cooler weather a longer interval between spraying may be satisfactory. Repeated spraying with any miscible oil is likely to cause a fall of the leaves, and resin wash may be the best insecticide. By these means the numbers may be kept down, but it is not suggested that it will be profitable to do so.

Williams (R. H.). **Locusts: Season 1922–23.**—*Jl. Dept. Agric. Union South Africa*, vii, no. 2, pp. 158–169, 5 figs., 1 map. Pretoria, August 1923.

Owing to the general heavy rains throughout South Africa, outbreaks of locusts in the season 1922–23 were even more severe than in the previous year [*R.A.E.*, A, x, 549]. During the season 8,732,550 gals. of diluted poison were issued. The culminating danger point of the locust menace is allowing the hoppers to reach the winged, breeding stage. It is impossible to picture the devastation that would have occurred had there been no locust law and no campaign, and if the 242,166 swarms of hoppers that were destroyed had been allowed to reach the winged stage. The most intense infestation was in Bechuanaland Protectorate, as the locusts there are hardly ever prevented from depositing. As a result of a campaign in this Territory, the swarms destroyed numbered 25,547, some of them being of extraordinary dimensions. In the early part of the season the locust birds were abundant in some districts, but where the rains were late the birds had migrated before the locusts hatched. *Wohlfahrtia brunnipalpis* was prevalent in some districts, but the fly mentioned in the previous report as depositing eggs in the egg pockets was not much in evidence. If climatic conditions are favourable, there is very little doubt that next season's infestation will be general and very severe.

Anderson (T. J.). **Insect Pests on Coffee.**—*Farmers' Jl.*, v, no. 32, pp. 23–27. Nairobi, 9th August 1923.

In this paper the life-history, habits, and occurrence in various parts of the world of *Coccus africanus* and its allies and the remedial measures adopted against it are discussed.

MASON (A. C.). **Relation of Environmental Factors to Wing Development in Aphids.**—*Florida Ent.*, vi, no. 2, pp. 25–32; vii, no. 1, pp. 1–7. Gainesville, Fla., September 1922 & July 1923.

Experiments with regard to effect of injury to food-plants, crowding, and the addition of chemical solutions to food-plants on wing development in Aphids are described. The results show that at least in the first generation changes of environment have no bearing on the production of winged forms. The young Aphid when born has its adult condition as regards presence or absence of wings already determined. External conditions must require more than one generation to produce their effects, and even in the second and third generations no positive results of their influence on wing formation were obtained.

In the case of *Lachnus pini* an alternation of winged and wingless forms was noted, and though the alternation was not perfect, the majority of the offspring of each individual belonged to the opposite type. This alternation was not apparent in *Myzus persicae* and *Aphis gossypii*, several generations being raised without obtaining winged forms.

WATSON (J. R.). **The Proper Name and Distribution of the Florida Flower Thrips.**—*Florida Ent.*, vii, no. 1, pp. 9–11. Gainesville, Fla., July 1923.

The author does not agree with Hood's treatment of *Frankliniella bispinosa*, Morgan, as a distinct species, and considers that it should remain as a variety of *F. tritici*, Fitch.

There are three yellow, flower-inhabiting thrips in Florida: *F. tritici bispinosa*, Morg., which ranges over the entire State; *F. tritici*, Fitch, found in small numbers in the western end of the State; and *F. cephalica masoni*, Wats., occurring in the south.

Amendment no. 1 to Regulations Supplemental to Notice of Quarantine no. 41 (Revised).—*U.S. Dept. Agric., Fed. Hortic. Bd.*, 1 p. Washington, D.C., 4th August 1923.

As a precaution against the introduction of the European corn borer (*Pyrausta nubilalis*), after 1st September 1923 broom corn may be brought into the United States only through the ports of New York (from November to February only) and Boston.

HARDING (P.). **Tests in Control of Leaf-roller.**—*Better Fruit*, xviii, no. 2, pp. 7–8, 1 graph, 1 table. Portland, Oregon, August 1923.

The distribution and bionomics of the leaf-roller [*Tortrix argyrospila*] in the United States are recorded [*R.A.E.*, A, ix, 164, 585]. In Utah entire apple crops have been lost owing to the ravages of this moth, particularly in recent years. Scattered egg masses at a distance of five miles from the original infestation have been discovered. This spread has taken place within the last two years, increasing nearly 100 per cent. in the second year.

Experiments against this pest with various American proprietary insecticides are described.

LOVETT (A. L.). **Earwig as Horticultural Menace.**—*Better Fruit*, xviii, no. 2, pp. 9-10, 1 fig. Portland, Oregon, August 1923.

The bulk of the information here given on the European earwig [*Forficula auricularia*] in Oregon has already been noticed from another source [*R.A.E.*, A, xi, 429].

MCCOLLOCH (J. W.). **The Hessian Fly in Kansas.**—*Kansas Agric. Expt. Sta.*, Tech. Bull. 11, 96 pp., 29 figs. Manhattan, Kans., July 1923.

Outbreaks of *Mayetiola* (*Phytophaga*) *destructor*, Say (Hessian fly) have occurred in increasing severity since 1871 in Kansas. The outbreaks usually last from 2 to 6 years. An account is given of the work in this connection during the last outbreak from 1912 to 1917 and of the life-history, habits and seasonal occurrence of the pest.

Remedial measures of practical value are chiefly preventive, consisting of early and deep ploughing of the stubble, proper preparation of the seed-bed, the destruction of all self-sown wheat and delay in sowing until the fly-free date. Parasites cannot be relied on for effective control of this midge; those bred from the pupae collected in Kansas are *Merisus destructor*, Say, *Micromelus subapterus*, Riley, *Eupelmus allynii*, French, *Polygnotus hiemalis*, Forbes, and *Platygaster herricki*, Packard. Brief notes are given on the biology and distribution of these natural enemies.

GOWDEY (C. C.). **Report of the Government Entomologist.**—*Ann. Rept. Jamaica Dept. Agric. 1922*, pp. 23-24. Kingston, 1923.

Lepidosaphes beckii, Newm. (long scale) and *Chionaspis minor*, Comst. (snow scale) caused considerable injury to all species of *Citrus*. *Aleurocanthus woglumi*, Ashby (citrus black fly) does not appear to be gaining ground very rapidly. It is preyed upon by the Coccinellids, *Scymnillodes aeneus*, Sic., and *S. cyanescens*, Sic., and is heavily infested with the fungus, *Aschersonia goldiana*. *Selenaspidus articulatus*, Morg. (armoured scale) is recorded as seriously injuring tangerines [*Citrus nobilis*].

Cosmopolites sordidus, Germ. (banana borer) is undoubtedly increasing in districts where the necessary precautionary measures have been neglected; wherever the trap method of control has been systematically carried out, the results have been very satisfactory. Serious injury to tobacco has been caused by the larvae of *Prodenia ornithogalli*, Guen., *Protoparce sexta jamaicensis*, Johan., and *Deilephila* (*Celerio*) *lineata*, L.

Oeceticus abbotti, Grote, is recorded for the first time attacking the leaves of coconut. Stems infested with bacterial or fungous diseases were in several instances attacked by *Xyleborus perforans*, Woll. Other coconut pests are *Chrysomphalus dictyospermi*, Morg., *Aleurodicus cocois*, Curt., and *Cerataphis lataniae*, Boisd.

Laphygma frugiperda, S. & A. (fall army worm) was reported on maize. The infestations of sisal by the scale, *Pseudischnaspis bowreyi*, Ckll., were considerably less severe, and the sisal weevil, *Scyphophorus acupunctatus*, Gyl., was only recorded once from this crop. The only pest of cacao recorded during the year was *Asterolecanium pustulans*, Ckll. (akee fringed scale).

Other pests were *Diaspis* (*Aulacaspis*) *pentagona*, Targ. (West Indian peach scale), *Aspidiotus cydoniae*, Comst. (quince scale), *Chrysomphalus personatus*, Comst. (masked scale), *Macrosiphum* (*Aphis*) *illinoisensis*, Schim., *Apate terebrans*, Pall., and *A. monacha*, F., all on grape; *Aleurothrixus floccosus*, Mask., attacking foliage of guava [*Psidium guayava*]; *Myzus* (*Rhopalosiphum*) *persicae*, Sulz., and *Diabrotica theimei*, Baly, on cucumbers; the larvae of *Protoparce sexta jamaicensis*, Johan., on fruit, and *Nezara marginata*, P. de B., on foliage, of tomato; *Ceroplastes ceriferus*, And., and *Diaspis* (*Aulacaspis*) *rosae*, Bch., on roses; and *Saissetia hemisphaerica*, Targ., on ferns.

Pests of stored grain were *Calandra oryzae*, L. (rice weevil) attacking rice and maize; *Tenebroides mauritanicus*, L. (cadelle beetle); and *Tribolium ferrugineum*, L. (rust red flour beetle) attacking oats.

COSENS (A.). **Reports on Insects of the Year. Division no. 3, Toronto District.**—*53rd Ann. Rept. Ent. Soc. Ontario 1922*, p. 10. Toronto, 1923.

The introduced ground beetle, *Carabus nemoralis*, is becoming more abundant and is one of the most useful predacious insects in the Toronto district. Larvae of the moth, *Mompha stellella*, Busck, were found feeding on flower buds of the cultivated evening primrose (*Oenothera biennis*) in July. *Diastrophus fragariae*, Beutm. (strawberry petiole gall) is recorded for the first time from cultivated plants; *D. turgidus*, Bass., infesting raspberry, and *D. cuscutaeformis*, O.S., attacking blackberry, were found on both the wild and cultivated species of their food-plants.

MCLAINE (L. S.). **The Distribution of the European Corn Borer in Ontario during the Summer of 1922.**—*53rd Ann. Rept. Ent. Soc. Ontario 1922*, pp. 10–13. Toronto, 1923.

This information has already been noticed from another source [*R.A.E.*, A, xi, 157].

CRAWFORD (H. G.). **Ploughing as a Factor in the Control of the European Corn Borer in Ontario.**—*53rd Ann. Rept. Ent. Soc. Ontario 1922*, pp. 13–18. Toronto, 1923.

During investigations in 1921 it was noticed that larvae of the European corn borer [*Pyrausta nubilalis*, Hb.] when buried with infested maize stalks under certain conditions subsequently came to the surface of the ground. This paper deals with the autumn (1922) activities of the larvae ploughed down with the refuse left in the field after a severely infested crop had been harvested in the regular manner. The results clearly demonstrate that in Ontario, an essentially one-brooded area, the larvae come to the surface in important proportions when ploughed down in the autumn, and that this proportion increases with earliness of ploughing. It is not however quite clear what becomes of these larvae. A general survey of some other experimental results bearing on the probable behaviour of the larvae when moving from a given experimental concentration indicates that they wander for short distances and establish themselves rather promptly in available suitable material in the immediate vicinity.

Further investigations in this connection are needed.

SPENCER (G. J.). **Further Notes on the Life-history of the European Corn Borer in Ontario.**—*53rd Ann. Rept. Ent. Soc. Ontario 1922*, pp. 18-25. Toronto, 1923.

The winter of 1921 had very little effect on the larvae of the European corn borer [*Pyrausta nubilalis*, Hb.], only from 4 to 5 per cent. being killed by all causes. In the warmer weather in the spring the ant, *Lasius niger americanus*, Emery, destroyed many of the borers in the experimental cages and also attacked the larvae in the field. The Tachinid parasite, *Exorista nigripalpis*, Towns., proved to be very scarce during 1922. Experiments on the factors that influence the various stages of the moth are described. It was found that there was no great difference in average infestation in various varieties of maize.

CAESAR (L.) & ROSS (W. A.). **Insects of the Season in Ontario.**—*53rd Ann. Rept. Ent. Soc. Ontario 1922*, pp. 33-39. Toronto, 1923.

The pests of fruits recorded were: *Cydia* (*Carpocapsa*) *pomonella* (codling moth), more abundant than usual in some districts; *Tortrix argyrospila* (fruit-tree leaf-roller); *Rhagoletis pomonella* (apple maggot); *R. cingulata* and *R. fausta* (cherry fruit-flies); *Eucosma* (*Tmetocera*) *ocellana* (bud moth); *Coleophora fletcherella* (cigar case-bearer); *C. malivorella* (pistol case-bearer); *Palaeacrita vernata* and *Alsophila pometaria* (canker worms), causing considerable injury; *Empoa rosae* and *Empoasca mali*, unusually abundant; *Lygidea mendax* (red bug); *Lygus communis* (green apple bug), kept under control by spraying with nicotine sulphate; *Myzus cerasi* (black cherry aphis); *M. persicae* (green peach aphis); *Paratetranychus pilosus* (plum mite); *Psylla pyricola* (pear psylla); *Macrodactylus subspinosus* (rose chafer) [*R.A.E.*, A, xi, 185]; *Aspidiotus perniciosus* (San José scale); *Eriocampoides limacina* (pear and cherry slug), particularly scarce; *Hemerocampa leucostigma* (white marked tussock moth); *Conotrachelus nenuphar* (plum curculio); *Eriophyes pyri* (pear blister mite); *Metallus bethunei* (blackberry leaf-miner); *Pristiphora pallipes*, Lep. (*Diphadnus appendiculatus*, Hart.) (gooseberry sawfly); *Monophadnus rubi* (raspberry sawfly); *Byturus unicolor*, on raspberries; *Exartema permundanum* (raspberry leaf-roller); *Zophodia grossulariae* (gooseberry fruit worm), causing considerable damage to gooseberries and red currants; *Anthonomus signatus* (strawberry weevil); and *Typophorus* (*Paria*) *canellus* (strawberry leaf beetle).

The pests of vegetables were: *Phorbia brassicae* (cabbage maggot); *Hylemyia antiqua* (onion maggot); *Thrips tabaci* (onion thrips); *Diabrotica vittata* (striped cucumber beetle); *Aphis gossypii* (melon aphis); *Pieris rapae* (imported cabbage worm); *Phytometra* (*Autographa*) *brassicae* (cabbage looper); *Lixus concavus* (rhubarb curculio); *Heliothis obsoleta* (corn ear worm), which has almost totally disappeared; *Pyrausta nubilalis* (European corn borer); *Agrotis c-nigrum* (spotted cutworm), unusually abundant; and *Empoasca mali* (potato leafhopper), *Epitrix cucumeris* and *Leptinotarsa decemlineata* (Colorado potato beetle), causing serious damage to potatoes.

Other pests recorded were: *Lygus pratensis* (tarnished plant bug), injurious to chrysanthemums; *Camnula pellucida* (roadside grasshopper); *Okanagana canadensis*; *Blissus leucopterus* (chinch bug); the ant, *Monomorium pharaonis*; *Anthrenus scrophulariae* (buffalo carpet beetle); *Plodia interpunctella* (Indian meal worm); *Calandra oryzae* (rice weevil); *Silvanus surinamensis* (saw-toothed grain beetle); and *Bryobia praetiosa* (*pratensis*) (clover mite).

Treherne (R. C.). **Notes on *Frankliniella tritici* (Fitch).**—*53rd Ann. Rept. Ent. Soc. Ontario 1922*, pp. 39–43. Toronto, 1923.

Frankliniella tritici, Fitch, and two closely allied species, *F. occidentalis*, Perg., and *F. californica*, Moult., are of common occurrence in Canada, though they appear to cause severe injury only to lucerne. *F. tritici* has also been incriminated as a carrier of blossom infection of fire blight. The method of injury to clover is discussed. The systematic position of *Frankliniella* is dealt with, and a modification of Karny's key is given [*R.A.E.*, A, xi, 109].

Hutchings (C. B.). **Some Notes on the Biology of two Buprestids infesting Blackberry and Hazel.**—*53rd Ann. Rept. Ent. Soc. Ontario 1922*, pp. 43–46, 1 plate. Toronto, 1923.

The adults of *Agrilus ruficollis*, F., were found about the third week in June feeding on the upper leaf surfaces of blackberries and raspberries. Blackberries are undoubtedly the favourite food-plant; the beetles only feed sparingly on the purple-flowering raspberry (*Rubus odoratus*). The eggs are laid either singly or in groups of from 2 to 6 at the axils of the branches and are inserted chiefly between the outer and inner bracts close to the main stem. They begin to hatch after three weeks. The larvae work spirally round the branch and then continue to the main stem, tunnelling several times in the bark before entering the pith. This causes the stem to crack longitudinally in many places, producing an elliptical swelling known as gouty gall and resulting in the death of the branch the following year. The winter is passed in the stem, and pupation occurs the following May. The adults gnaw their way out, leaving an exit hole of semilunar shape. As soon as the leaves appear in the spring, the galls should be cut out and destroyed.

A. politus, Say, though of less economic importance than *A. ruficollis*, is a serious pest of hazel (*Corylus*). Knot-like galls are formed, and the attacked branches are killed. There appears to be no special choice of site for oviposition. The incubation period is about three weeks, hatching beginning about 20th July. The larva enters the bark beneath the egg and tunnels around the twig near the surface, the branch being completely girdled. Pupation occurs well down in the woody tissues of the stem, the adult emerging through a D-shaped opening which is characteristic of the genus. During 1922 pupation occurred during the last week in May, and the largest number of adults was found between 16th and 20th June.

The remedial measures recommended are the same as for *A. ruficollis*.

Maheux (G.). **Insects of the Season in Quebec in 1922.**—*53rd Ann. Rept. Ent. Soc. Ontario 1922*, p. 46. Toronto, 1923.

The usual pests were recorded during the season but no new one of any importance occurred.

Ross (W. A.) & Robinson (W.). **The Grape Leaf-hopper.**—*53rd Ann. Rept. Ent. Soc. Ontario 1922*, pp. 48–60, 5 figs. Toronto, 1923.

During 1921–22 a general outbreak of *Typhlocyba* (*Erythroneura*) *comes*, Say (grape leaf-hopper) occurred in the Niagara peninsula. Descriptions are given of the various stages, as well as a detailed account of the life-history [*cf. R.A.E.*, A, iv, 405] and seasonal occurrence.

The remedies recommended have already been noticed from another source [*R.A.E.*, A, xi, 376].

DOWNES (W.). **Mechanical Devices as Aids in the Control of the Strawberry Root Weevil** (*O. ovatus*, **L.**).—*53rd Ann. Rept. Ent. Soc. Ontario 1922*, pp. 61–64, 2 figs. Toronto, 1923.

One of the chief features of the experimental work in connection with *Otiorrhynchus ovatus*, L. (strawberry root weevil) during the last four years in British Columbia has been the trial of various weevil-proof barriers. Details are given of the construction and working of two such barriers, one of which was originally suggested by Lovett [*R.A.E.*, A, i, 131], and the cost of erecting them. Both proved highly successful as a means of trapping the weevils and preventing their migration to uninfested fields. An analysis of the different kinds of insects caught in these barriers shows a very small percentage of beneficial insects. Boards are so placed in the ground that they project above it for about 9 inches; at the joints they are supported by posts. The upper edge of the board is covered with an adhesive. This form of barrier is improved by placing traps to catch the weevils at intervals along the barrier. The trap, which consists of a tin, containing water with a film of oil, sunk into the soil against the barrier is described in detail. A more convenient combination of barrier and trap may, however, be made by using 2 in. × 10 in. boards with a V-shaped groove in the upper edge. The groove should be $1\frac{1}{2}$ inches deep and 1 inch wide and the ends should be blocked and rendered oil tight. The groove is filled with crude oil. This type of barrier requires very little attention beyond replenishing the oil and preventing leaks. On sloping land it should be built in steps, and some adhesive should be placed at the joints where the weevils might cross.

ROSS (W. A.) & HALL (J. A.). **Recent Work on the Rose Chafer in Ontario.**—*53rd Ann. Rept. Ent. Soc. Ontario 1922*, pp. 64–70, 3 figs. Toronto, 1923.

The food-plants and life-history of the rose chafer [*Macrodactylus subspinosus*, F.] in Ontario are discussed, and recommendations are made for its control [*R.A.E.*, A, xi, 185].

HUDSON (H. F.) & WOOD (A. A.). **Oviposition of** *Hypera punctata*.—*53rd Ann. Rept. Ent. Soc. Ontario 1922*, pp. 70–72. Toronto, 1923.

Hypera punctata (clover leaf weevil) exhibits unusual care in the choice of a suitable site for oviposition. The eggs are generally introduced through a very small puncture into the petiole just above the sheath or about $\frac{3}{4}$ inch below the leaflets. The process is described in detail.

BRINK (J. E.). **The Sunflower Maggot** (*Straussia longipennis*, **Wied.**).—*53rd Ann. Rept. Ent. Soc. Ontario 1922*, pp. 72–74. Toronto, 1923.

In some districts the cultivation of maize has been given up entirely owing to the ravages of the European corn borer [*Pyrausta nubilalis*, Hb.] and the chinch bug [*Blissus leucopterus*, Say].

The sunflower is becoming important as a silage crop in Western Canada and other regions where maize does not thrive. It is infested by *Straussia longipennis*, Wied. (sunflower maggot), which feeds on both the wild and cultivated varieties and has also been found attacking

Jerusalem artichokes (*Helianthus tuberosus*). The first appearance of the adults of this Trypetid varies according to temperature, moisture and locality. The eggs hatch in from 5 to 6 days. The damage is done by the larvae. They scratch the pith of the stem and suck the juice, the pith turning brown and black. By the end of the season the whole pulp of the stalk may be eaten out; many of the weakened stalks fall over and may be subsequently attacked by mould. The injury also interferes with seed production, reducing it by about 37 per cent. The larvae remain in the stalk until the autumn, when they enter the soil for pupation. Those near the base enter the ground through the stalk, while those further up bore their way out and drop to the ground.

Experiments with hydrocarbons and oil of citronella showed these substances to be useless; it is possible that spraying with lead arsenate against the adult flies may prove effective, though this still remains to be tested.

Hammond (G. H.). **Notes on the Seed Potato Maggot** (*Hylemyia trichodactyla*, **Rond.**).—*53rd Ann. Rept. Ent. Soc. Ontario 1922*, pp. 74–75. Toronto, 1923.

Phorbia (*Hylemyia*) *trichodactyla*, Rond. [*R.A.E.*, A, x, 193], which had not previously been recorded from turnips, attacked this crop in Ottawa during 1922. There was no evidence of direct tunnelling in the plant, but the tap roots had been cut through about the ground level. On one acre about 65 per cent. of the plants were attacked, of which 50 per cent. appeared beyond the hope of recovery.

McColloch (J. W.) & Hayes (W. P.). **The Reciprocal Relation of Soil and Insects.**—*Ecology*, iii, no. 4, pp. 288–301. Brooklyn, N.Y., October 1922. [Received 3rd September 1923.]

The author considers that entomologists have not given to the soil the consideration necessary to an understanding of many fundamental animal activities. This paper is regarded as a preliminary survey of the field of soil entomology, and it discusses the various orders of insects that may be found in the soil and their relation to that environment. Insects use the soil for shelter, protection, material for abode, food, moisture, air, warmth, and as an avenue of travel. They may also become considerably modified or adapted for living in the soil, and there may be reciprocal benefits, such as soil formation, renovation and maintenance by insects. Soil study is also essential to many remedial measures, and soil technicalities will have a large place in fumigation work. The use of insecticides against subterranean insects has never been developed, though a few successful experiments have been made, as in the use of kerosene emulsion against the grubs of *Allorrhina* (*Cotinis*) *nitida*. The effect of constant arsenical spraying on the ground beneath fruit-trees in causing arsenical poisoning of the trees themselves requires investigation. The use of repellents in the soil has long been advocated, but has received little attention. The use of fertilisers is often recommended as insecticides or to stimulate growth after insect injury, and other remedial measures directly connected with the soil are dynamiting for the destruction of white grubs [*Lachnosterna* spp.], the use of tile drains for the control of certain wireworms, and irrigation against the sugar-beet root-louse [*Pemphigus betae*].

McColloch (J. W.) & Hayes (W. P.). **Soil Temperature and its Influence on White Grub Activities.**—*Ecology*, iv, no. 1, pp. 29–36, 1 fig. Brooklyn, N.Y., January 1923. [Received 3rd September 1923.]

Previous work on the migration of white grubs and May beetles and its relation to temperature is reviewed. The observations here described have been continued since 1912. The records for the earliest appearances of these grubs behind the plough are: *Lachnosterna* (*Phyllophaga*) *lanceolata*, 6th March; *L.* (*P.*) *rugosa*, *L.* (*P.*) *crassissima*, *L.* (*P.*) *implicita* and *Ochrosidia* (*Cyclocephala*) *immaculata*, 28th March. The grubs were rarely taken behind the plough after 1st November, and very few after 15th October. During the winter of 1920–21 a series of experiments were started in order to obtain more accurate data on the migration of the grubs in the soil, the results of which are presented in a table. Single examples of *L. rugosa* and *L. implicita* were found at a depth of 10 inches on 21st February. In December the grubs were at their deepest in the soil, the average being 21 inches; the depth gradually decreased until in March they were found at an average depth of 12·5 inches. Several parasites of the grubs were encountered during these experiments; thus *Tiphia* sp. was found at 16 inches, a cocoon of *Elis* sp. at 13 inches and *Mermis* sp., probably parasitic on the grubs, at 24 inches. The winter happened to be a very mild one, and the authors have taken beetles and grubs at much greater depths in other years; on one occasion *Ligyrus gibbosus* was found a little over 4 feet below the surface.

In studying the temperature of the soil it was found that there are two complete overturns of this temperature in the year, one in the spring and the other in the autumn. Coincident with the spring overturn the grubs come up from the subsoil and with the autumn overturn they migrate downwards to a depth of 2 feet or more. Sudden changes, unless of prolonged duration, do not affect the temperature below 3 feet. The influence of various factors on the soil temperature is discussed.

Smith (G. D.). **A Preliminary Report upon an Improved Method of Controlling the Boll Weevil.**—*Florida Agric. Exp. Sta.*, Bull. 165, 72 pp., 13 figs. Gainesville, Fla., October 1922. [Received 11th September 1923.]

This information has already been noticed from another source [*R.A.E.*, A, xi, 73].

Watson (J. R.). **Report of Entomologist.**—*Florida Agric. Expt. Sta., Rept. 1921–22*, pp. 56–59 R. [Gainesville, Fla., 1922.] [Received 11th September 1923.]

The main new points during 1921–22 respecting thrips attacking citrus are that spraying should be done in the height of the bloom, that weeds are important as a source of infestation, that results will more than repay the cost of nicotine sulphate in a combination spray when there are present as many as 10 thrips to a bloom, and that oranges are more seriously injured than grape-fruit. A dust composed of lime impregnated with nicotine sulphate will kill all thrips hit with it, though it is necessary to hit a blossom squarely and with

considerable force to get into the interior of it where the thrips work. There is a marked preference on the part of thrips for certain varieties of peanuts. Thrips do not seem to be as important pests of the satsuma as of the round oranges, largely because they bloom a month later and after the maximum infestation has passed. The larger plant bugs are very injurious to this fruit, especially in groves where beggarweed or cowpeas have been used as a cover crop. It has been recommended that the bush velvet bean be substituted for these crops where the soil is suitable.

Tanaomastix (*Paraleptomastix*) *abnormis*, Gir. (Sicilian mealy-bug parasite) was bred in large numbers and distributed to growers, but it is too early to determine whether or not it has become established. Further observations on the correlation between the severity of the winter frosts and abundance of *Anticarsia gemmatalis*, Hb. (velvet-bean caterpillar) the following summer are recorded. The mild winters of the last two years resulted in a heavy infestation by this moth. Insect parasites are of little importance, but predators and fungous parasites are of great value.

In root-knot investigations the striking success of the bush velvet bean under constant cultivation was the chief result. The beans were planted in rows and kept free of weeds and grass and the soil never allowed to retain a crust. It was cultivated at least once a week and after every heavy rain. The Nematodes were reduced to such small numbers that it was possible to grow susceptible crops on the land all the winter and spring. The effect of fumigation with sodium cyanide-ammonium sulphate was greatly increased by covering the beds during treatment to confine the gas. A sheet of balloon cloth was used, but tarred paper does nearly as well if the joints where the sheets overlap are made air-tight. This can be done quickly by throwing soil over them. When 400 lb. or more to the acre of cyanide was used, the Bermuda grass was completely killed on the covered plots, which was not the case on treated plots left uncovered. Experiments have been started to test the value of sulphur inoculated with sulphur-oxidising bacteria as a vermicide.

Considerable attention has been devoted to *Empoasca mali*, Le B. (bean Jassid) [*cf. R.A.E.*, A, x, 532], and work on *Nezara viridula*, L., *Acanthocephala femorata*, F., *Leptoglossus phyllopus*, L., and *Alcaeorrhynchus grandis*, Dall., has been continued. The latter bug was found severely damaging egg plants, but the same parasites that keep the others in check, of which *Trichopoda pennipes*, Wd., is the most important, were found to be the chief parasites of this species.

MORGAN (A. C.). **Tobacco Hornworm Insecticide: Recommendations for Use of Powdered Arsenate of Lead in Dark-tobacco District.**—*U.S. Dept. Agric.*, Farmers' Bull. 1356, revd., 7 pp. Washington, D.C., June 1923.

This is a revision of bulletins that have been noticed [*R.A.E.*, A, ii, 601; vi, 216] on the use of arsenicals against the Sphingids, *Protoparce sexta*, Joh., and *P. quinquemaculata*, Haw. In addition to those previously dealt with, the merits of calcium arsenate are considered. It is somewhat cheaper than lead arsenate, and is effective when used in approximately as heavy doses. It is safer than Paris green, but as it is more likely to scorch tobacco than lead arsenate, its use is not recommended.

CHITTENDEN (F. H.). **The Australian Tomato Weevil introduced in the South: A Preliminary Account.**—*U.S. Dept. Agric.*, Dept. Circ. 282, 8 pp., 6 figs. Washington, D.C., 31st July 1923.

An account is given of the discovery in the southern United States of *Listroderes* (*Desiantha*) *nociva*, Lea (Australian tomato weevil) and of its injurious habits and the possibility of controlling it [*R.A.E.*, A, xi, 374]. It is thought that the weevil will be confined to the southern States for many years, as in all probability it cannot readily adapt itself to the much lower winter temperatures of the north. It is feared that such southern crops as tobacco and egg-plant, which bear a close relationship to the Solanaceous plants preferred by this weevil, may in time be attacked. In Mississippi the beetles began to renew their activities after aestivation on 18th November 1922. The larvae hatch in the soil, shelter underground, and emerge to feed at night on the bark and foliage of plants. Pupation occurs in the earth, and it is the adults that do the greatest amount of damage, working until April or May, when they begin to disappear. The adults hide just below the surface of the soil or under plants, and both beetles and larvae attack all parts of plants above ground, including the root of turnip. In the case of potatoes, scars were formed along the stems of the plants, sometimes severing them. Besides the lead arsenate sprays formerly recommended, it is suggested that calcium arsenate would probably be equally effective either as a dust or spray, and it is a little cheaper. The distribution of poison baits would probably also be successful.

The stages of the insect are described.

DA COSTA LIMA (A.). **Os insectos damninhos. xxix. A cuyabana,** *Prenolepis fulva*, **Mayr.** [Injurious Insects. xxix. *P. fulva.*]—*Chacaras e Quintaes*, xxviii, no. 2, pp. 118–119, 1 fig. S. Paulo, 15th August 1923.

The congress of the Municipalities of the State of Minas has adopted a resolution calling upon the State Government to arrange for the spread of *Prenolepis fulva*, Mayr, in the agricultural districts in order to combat the leaf-cutting ant, *Atta sexdens*, L. As *P. fulva* protects Aphids and Coccids to a marked degree, this method is dangerous and should not be employed, the losses resulting from the presence of *P. fulva* exceeding those due to *A. sexdens*.

SCOTT (W. L.). **Entomology.**—*Rept. Agric. Dept., Assam, 1922–23*, p. 6. Shillong, 1923.

Work on the control of *Agrotis ypsilon* on onion crops has been continued with Andrès Maire traps, and the results have favourably impressed the cultivators. Rice case-worm [*Nymphula depunctalis*], rice Hispid [*Hispa armigera*], stem-borers [*Schoenobius incertellus*] and grasshoppers were general pests reported. The larvae of a Melolonthid beetle were reported to have caused heavy damage to the sugar-cane crop.

BEVAN (W.). **[Insect Pests in Cyprus in 1922.]**—*Ann. Rept. Director Agric., Cyprus, 1922*, pp. 9 & 24. Nicosia, 1923.

The chief fruit-tree pests, which have been kept under control by spraying, are codling moth [*Cydia pomonella*], ermine moth [*Hyponomeuta*], *Zygaena ampelophaga*, *Cecidomyia ceratoniae* (carob midge),

and various olive and other pests. *Phthorimaea operculella* (*Lita solanella*) (potato moth) has been spreading for four years, and in nine months large quantities of attacked potatoes have been condemned. *Ceratitis capitata* (*hispanica*) (Mediterranean fruit-fly) has again appeared in the orange groves.

S. **Bekämpfung von Ameisen in Obstkulturen.** [Combating Ants in Orchards.]—*Schweiz. Zeitschr. Obst- u. Weinbau*, xxxii, no. 18, pp. 322–323. Frauenfeld, 1st September 1923.

Ants may be driven away by strewing a somewhat thick layer of finely chopped chervil on the nests. A better method consists in placing near the nests plant-pots, turned upside down and smeared inside with fruit syrup or honey; the hole in the bottom must be covered with a stone. The ants will nest in the pots and may be destroyed by putting the pots and their contents in boiling water. Removal for this purpose is easily effected if a sheet of glass is slipped under the pot before it is lifted.

[Reports on the State of Crops in each Province of Spain on the 20th August 1923.]—*Bol. Agric. Téc. y Econ.*, xv, no. 176, pp. 803–817. Madrid, 31st August 1923.

In some localities, the scales [*Chrysomphalus dictyospermi*, Morg., and *Lepidosaphes beckii*, Newm.] have appeared in orange groves, and plums have been attacked by *Hyponomeuta padellus*. Crops on irrigated land have been seriously infested by *Laphygma exigua*, some being totally destroyed. Sugar-beet, pimentos and tomatos in Navarra are threatened with complete destruction by a Noctuid.

MYERS (J. G.) & ATKINSON (E.). **The Relation of Birds to Agriculture in New Zealand. III. The larger Fruit- and Insect-eating Perching-birds** (*Passeres*).—*N. Z. Jl. Agric.*, xxvii, no. 1, pp. 13–19, 1 fig. Wellington, 20th July 1923.

The third paper of this series [*R.A.E.*, A, xi, 426] discusses the advantages of a number of New Zealand birds from an economic standpoint. Amongst those dealt with *Zosterops lateralis* is considered the most beneficial. The cabbage or turnip aphis [*Brevicoryne brassicae*, L.], which sometimes infests swedes and turnips to an incredible extent, is frequently cleared by it. Whenever a pest is introduced into a district where large quantities of its food-plant have been hitherto uninfested, as in the case of *Eriococcus coriaceus*, Mask. (blue-gum scale), these birds will concentrate there. They also attack *Rhinocola eucalypti*, Mask. (blue-gum psyllid), which infests the growing tips of young trees throughout the country. Their value in destroying all the major pests of New Zealand orchards counterbalances the depredations committed by them when fruit is ripe.

HEGH (E.). **Les Termites. Annexes à la première partie (Cinq premiers chapitres).**—*Bull. agric. Congo belge*, xiv, no. 2–3, pp. 404–432. Brussels, June–September 1923.

The nomenclature of species, subspecies and varieties of African termites are discussed in this instalment of this work, which has been noticed separately as a whole [*R.A.E.*, A, x, 570].

KENT (C. C.). **Dormouse and Bagworm.**—*S. African Jl. Nat. Hist.*, iv, no. 2, pp. 146–148. Pretoria, May 1923.

In May 1922 a number of gnawed and empty coverings of *Acanthopsyche junodi*, Hey. (wattle bagworm) were found in Natal, apparently destroyed by a dormouse, which was captured and kept under observation. The dormouse was found to attack the bags while they were attached to the tree, even at heights of from 15–25 ft. from the ground. In a cage, it devoured the contents of as many as 30 bags in one night and nearly 300 in a month. These were preferred to a great variety of seeds. Many other insects were offered to it, and, when it was hungry, cockroaches, beetles, moths, grasshoppers and ants were eaten; fruits were only eaten in the absence of water.

FAURE (J. C.). **The Life-history of the Brown Locust, *Locustana pardalina* (Walker).**—*Jl. Dept. Agric. Union S. Africa*, vii, no. 3, pp. 205–224, 2 pls. Pretoria, September 1923.

This paper on *Locustana pardalina*, Wlk., deals with observations made on locusts confined in cages at Pretoria, though some statements are based on field observations as well. The results are regarded by the author as still somewhat incomplete, and the checking and amplification of data by repeated observations and experiments are required.

Five larval stages are described, and the duration of each of them established by cage observations. The whole larval period occupies on the average 52 days in summer and 90 in winter, the shortest period observed being 34 days. The behaviour of larval swarms is briefly described; the general direction of mass movements is stated to be towards the east, although westward movements were also observed.

The food of both immature and adult stages has been found to consist primarily of grasses; and lucerne, potatoes, vegetables, weeds, native bushes, etc., are ordinarily not eaten. Cannibalism is a common occurrence. Parthenogenesis has been observed in the case of one female, which laid seven packages of unfertilised eggs from which three larvae were hatched.

The period between the beginning of the winged stage and the laying of the eggs varies between 15 and 56 days. In the field some females may deposit egg packages singly, but the majority of egg deposits are concentrated. Sandy soil, though not necessarily loose sand, is preferred for egg laying; it may take place, however, in very hard soil. A favourite site for oviposition seems to be on gently sloping ground near the foot of a ridge or hill. The largest number of packages deposited by one female (in cages) was 14, the average being 5·1, and it is assumed that in the field one female may ordinarily lay 6–10 packages of eggs, containing about 320 eggs in all. The longest period of life of an adult was 133 days, the average being 77·4 days. The shortest incubation period observed was 6 days, and this occurred in the case of some eggs kept moist in an incubator at a temperature of about 30° C. [86° F.]; in out-door cages the shortest period observed was 15 days, but as a rule the length of the incubation period depends to a large extent on rains, which, in warm weather, induce hatching; eggs kept dry may not hatch for months or even years.

The number of generations a year depends, within limits, upon various factors, such as rainfall, temperature, food supply, and natural

enemies. It is quite usual for the locust to pass through two generations, and three probably occur in some seasons. The theory of phases advanced by Uvarov [*R.A.E.*, A, ix, 561] to explain the periodicity of locusts is supported by the author's observations in the field and by breeding experiments in which direct transformation from one phase into another during the larval life of an individual has been observed many times. The main factor causing the appearance of the swarming phase has been found to consist in keeping the hoppers of any phase in large numbers together in one cage; if larvae of the swarming phase are kept under such conditions, they retain their characters throughout the larval life and become flyers of the swarming phase, while the hoppers of the solitary phase placed under like conditions underwent a gradual transformation into the swarming phase. Isolation of hoppers of the swarming phase invariably resulted in their transformation into the solitary phase. No attempt to find out the physiological factor involved in this phenomenon has been made. The practical importance of these phases is strongly emphasised, and the necessity of watching for solitary locusts and the appearance of the first groups of the swarming phase is urged.

The natural breeding grounds are briefly discussed, and these are described as short mixed veld, consisting of grass and native bushes, and sandy soil with limestone outcrops. Various stages of both phases are figured on a good coloured plate, and another represents the types of cages used in the experiments.

PITTIONI (B.). **Noctuidenfang an "natürlichem" Köder.** [Noctuids caught at natural Baits.]—*Ent. Zeitschr.*, xxxvii, no. 9, pp. 21–22. Frankfurt a.M., 4th August 1923.

In this list of 58 different species of Noctuid moths 38 were taken feeding on the honeydew of Aphids, those of economic importance including:—*Agrotis pronuba, Feltia* (*Agrotis*) *exclamationis, Agrotis ypsilon, Euxoa* (*Agrotis*) *segetum, Scotogramma* (*Mamestra*) *trifolii, Trachea* (*Hadena*) *secalis, Athetis clavipalpis* (*Caradrina quadripunctata*) and *Amphipyra tragopoginis.*

BODENHEIMER (F. S.). **Die parasitären Beziehungen zwischen Würmern und Insekten.** [The Parasitic Relationships between Worms and Insects.]—*Centralbl. Bakt., Protozool., Paras., Infekt.*, IIte. Abt., lviii, no. 9–12, pp. 220–242. Jena, 1st March 1923. [Received 5th September 1923.]

This is a survey of the literature on the subject indicated by the title.

KROMBHOLZ (E.). **Ueber die Ausgabe von Uraniagrün für landwirtschaftliche Zwecke unabhängig von der Lösung eines Giftbezugscheines.** [On the Supply of Urania Green for Agricultural Purposes without a Poison Licence.]—*Mitt. Volksgesundheitsamtes*, no. 8, pp. 281–285. Vienna, 1st September 1923.

The Austrian Company for Plant Protection having submitted a memorandum asking that Urania green should be purchasable without a poison licence, the authorities concerned have refused to allow this, but have decided to recommend that the use of poisons against pests should be the subject of special regulations.

Gabritchevski (E. G.). **Постэмбриональное развитие, партеногенез и „педогамия" у кокцид (Coccidae).** [Post-embryonal Development, Parthenogenesis and Paedogamy in Coccids.]—**Русский зоолог. журнал.** [*Rev. Zool. Russe*], iii, no. 3–4, pp. 295–332, 4 plates. Moscow, 1923. (With a summary in German.)

The contents of this paper are indicated by its title.

Minkiewicz (S.). **O masowym pojawie błyszczki jarzynówki:** *Plusia gamma*, **L., w 1922 r. na Wileńszczyźnie.** [The Abundance of *Phytometra gamma*, L., during 1922 in the Vilna District.]—*Polskie Pismo Ent.*, ii, pt. 2, pp. 85–89. Lemberg, 1923.

An account is given of an outbreak of *Phytometra* (*Plusia*) *gamma*, L., in the Vilna district during 1922.

Mokrzecki (Z.). **Z biologji błyszczki gammy** (*Phytometra* (*Plusia*) *gamma* **L.**).—*Polskie Pismo Ent.*, ii, pt. 2, pp. 93–103, 3 figs. Lemberg, 1923.

An account is given of the infestation during 1922 of *Phytometra gamma*, L., in the Vilna district. The various stages are described and the natural control is discussed.

Berezhkov (R. P.). **Борьба с саранчевыми методом отравленных приманок.** [The Control of Grasshoppers by the Method of Poisoned Baits.]—**Извест. Сибирского Энт. Бюро** [*Bull. Siberian Ent. Bur.*], no. 2, pp. 4–24. Petrograd, June 1923.

A comprehensive review is given of the work done in recent years in Russia on the control of grasshoppers by poisoned baits. This method has proved to be effective against *Gomphocerus sibiricus*, L., *Stauroderus* (*Stenobothrus*) *morio*, F., and other members of the genus, *Arcyptera flavicosta*, F., *A. fusca*, Pall., *Podisma pedestris*, L., *Psophus stridulus*, L., *Bryodema tuberculata*, F., *Calliptamus italicus*, L., *Locusta migratoria*, L., and *Dociostaurus maroccanus*, Thunbg.

The normal composition of the bait is 50–60 lb. of bran, 1½ lb. sodium arsenite and 3 gals. water. Sawdust and horse-dung may be used instead of bran. The addition of aromatic substances has not been found economical, and the attractiveness of the bait is stated to depend mainly on its moisture. The cost of poisoned baits is only ⅓–⅕ that of spraying. Methods of organising the work are described at length.

Bezrukov (Yu. G.). **Кубышки саранчевых.** [Egg-masses of Locusts.]—**Извест. Сибирского Энт. Бюро** [*Bull. Siberian Ent. Bur.*], no. 2, pp. 25–37, 20 figs. Petrograd, June 1923.

Egg-masses of the following species are described and figured, and a key for their identification is given: *Stenobothrus nigromaculatus*, H.Sch., *S. fischeri*, Ev., *Dociostaurus brevicollis*, Ev., *D. maroccanus*, Thunbg., *D. kraussi*, Ingen., *Arcyptera flavicosta*, Fisch., *A. fusca*, Pall., *Stauroderus* (*Stenobothrus*) *morio*, F., *Podisma pedestris*, L., *Gomphocerus sibiricus*, L., *Oedipoda gratiosa*, Serv. (*salina*, Pall.), *Oedaleus nigrofasciatus*, DeG., *Locusta migratoria*, L., *Calliptamus italicus*, L., *Aeolopus* (*Epacromia*) *tergestinus*, Charp., *Psophus stridulus*, L., *Oedipoda coerulescens*, L., *Celes variabilis*, Pall., *Bryodema tuberculata*, F., and *Tmethis muricatus*, Pall.

REIKHARDT (A. N.). **Работы экспедиции Наркомзема по изучению паразитов саранчевых в Сибири в 1922 году.** [Work of the Expedition of the Commissariat of Agriculture for a Study of the Parasites of Locusts in Siberia in 1922.]—**Извест. Сибирского Энт. Бюро** [*Bull. Siberian Ent. Bur.*], no. 2, pp. 38–45. Petrograd, June 1923.

Apart from some species of *Mylabris*, observations on which are recorded in a paper below, the natural enemies of grasshoppers include the Asilids, *Machimus gonatistes*, Zell., and *Dasypogon diadema*, F.; *Sarcophaga* sp.; the Orthoptera, *Decticus verrucivorus*, L., and species of the genus *Metrioptera* (*Platycleis*); the Carabids, *Amara pastica*, Dej., and *Harpalus hirtipes*, Panz. (found damaging the egg-masses); and the fungi, *Empusa grylli* on *Podisma pedestris*, L., and *Botrytis tenella* on egg-masses of *Arcyptera flavicosta*, Fisch.

PUKHOVA (N. N.). **Материалы по биологии сибирских нарывников с описанием триунгулинов. I.** [Materials for the Biology of Siberian Mylabrids, with Description of their Triungulins.]—**Извест. Сибирского Энт. Бюро** [*Bull. Siberian Ent. Bur.*], no. 2, pp. 45–53, 1 fig. Petrograd, June 1923.

The triungulin larvae of *Mylabris crocata*, Pall., *M. geminata* subsp. *sibirica*, F.-W., and *Epicauta megalocephala*, Gebl., are described, the first and the last named being also figured.

RAEVSKI (V. G.). **Наблюдения над прусом** (*Calliptamus italicus*, L.) **в Славгородском уезде в 1922 году.** [Observations on *Calliptamus italicus*, L., in the District of Slavgorod in 1922.]—**Извест. Сибирского Энт. Бюро** [*Bull. Siberian Ent. Bur.*], no. 2, pp. 53–58. Petrograd, June 1923.

Larvae of *Calliptamus italicus* of the fourth and fifth stages have been observed keeping in compact swarms. The swarms began to feed about 10 a.m., and movement started soon afterwards, stopping for the night about 5 p.m. The food consisted of *Artemisia siversiana*, various grasses and also dry semi-decayed vegetable refuse. Rooks, crows and jackdaws destroyed large numbers of the mature locusts.

The presence of larvae and adults of *Calliptamus italicus*, L., in pine woods is recorded; the appearance of larvae in woods was much later than that in open fields.

REIKHARDT (A. N.). **К биологии джунгарскаго хомячка** (*Cricetulus songarus*, **Pall.**). [On the Biology of *C. songarus*.]—**Извест. Сибирского Энт. Бюро** [*Bull. Siberian Ent. Bur.*], no. 2, pp. 59–63, 1 fig. Petrograd, June 1923.

Apart from vegetable food, the hamster, *Cricetulus songarus*, is stated to feed largely on insects in Siberia, and especially on locusts; large accumulations of chitinous remnants of *Arcyptera flavicosta*, *Dociostaurus* (*Stauronotus*) and other species of grasshoppers have been found in the nests. Large quantities of egg-masses of grasshoppers, as well as the adult insects, may also be found in the nests of common voles.

KHLEBNIKOV (M. I.). **Сезонные изменения в окраске капустного клопа** (*Eurydema oleraceum*, **L.**). [Seasonal Colour Variation in *E. oleraceum*.]—**Извест. Сибирского Энт. Бюро** [*Bull. Siberian Ent. Bur.*], no. 2, pp. 63–65. Petrograd, June 1923.

The observations here described in connection with *Eurydema oleraceum*, L., show that many of the supposed varieties of this bug are merely seasonal colour variations.

ALEKSEENKO (N. O.). **Очередные задачи Алтайской Станции Защиты Растений в 1923 году.** [Problems of the Altai Station for Plant Protection in 1923.]—**Извест. Сибирского Энт. Бюро** [*Bull. Siberian Ent. Bur.*], no. 2, pp. 65–68. Petrograd, June 1923.

Investigations in 1922 showed that besides the locusts, *Gomphocerus sibiricus*, L., *Arcyptera flavicosta*, Fisch., *Stauroderus* (*Stenobothrus*) *morio*, F., and *Calliptamus italicus*, L., the more serious pests are the Melolonthid, *Amphimallus solstitialis*, L., and wireworms of the genus *Agriotes*. Measures are to be carried out against these pests during 1923, those against the locusts consisting of poison baits. The organisation of the work is described.

JARVIS (E.). **Cane Pest Combat and Control.**—*Queensland Agric. Jl.*, xx, pt. 1, pp. 15–16. Brisbane, July 1923.

Further experiments with paradichlorobenzene against cane grubs have confirmed the value of this insecticide. A number of poison baits were tested against the termite, *Mastotermes darwinensis*. The best results were obtained with ½ oz. copper arsenite to 2½ pints of water, which killed 100 per cent. after 4 days. Pieces of cane were dipped in this solution and laid on the top of the soil. In cages the termites came out of the ground to feed on this bait, but whether they would do so under field conditions is not yet known. A bait composed of ½ oz. arsenious acid (white arsenic), with 1 oz. sodium carbonate to 3 pints of water, killed 100 per cent. in 7 days. Other baits are still being tried.

CARDÍN (P.). **Alimentacíon de las bibijaguas y fundacíon de nuevas colonias.** [The Nutrition of *Atta insularis* and the Founding of New Colonies.]—*Mem. Soc. Cubana Hist. Nat. Felipe Poey*, v, no. 2–4, pp. 58–62. Havana, 1923.

The ant, *Atta insularis*, Guér., is a serious pest in Cuba, where it defoliates orange trees and rose bushes.

ARANGO (R.). **Una plaga de las anonáceas en Cuba.** [A Pest of Anonaceae in Cuba.]—*Mem. Soc. Cubana Hist. Nat. Felipe Poey*, v, no. 2–4, pp. 79–82. Havana, 1923.

Custard apples (*Anona muricata*, *A. squamosa* and *A. reticulata*) in Cuba often fail to ripen as a result of infestation by a Chalcid, *Bephrata cubensis*, Ashm., which is of serious and increasing importance. The female oviposits in the seed of the developing fruit. The larva eats up the entire kernel, and the adult emerges from the hollow seed by means of the oviposition puncture. The direct injury is supplemented by fungous infections entering through it. No method of combating this pest is known.

Ballou (C. H.). **Nota sobre cóccidos cubanos.** [A Note on Cuban Coccids.]—*Mem. Soc. Cubana Hist. Nat. Felipe Poey*, v, no. 2–4, pp. 85–87. Havana, 1923.

A list is given of 62 Coccids, representing probably somewhat less than one-half of the species known from Cuba.

Barreto (B. T.). **Algunas nuevas especies de termitidos de Cuba.** [Some new Species of Termites from Cuba.]—*Mem. Soc. Cubana Hist. Nat. Felipe Poey*, v, no. 2–4, pp. 106–109. Havana, 1923.

The various species of termites observed in Cuba include *Cryptotermes brevis*, Wlk., *C. cavifrons*, Banks, *Eutermes morio*, Latr., *E. sanchezi*, Holm., *Arrhinotermes simplex*, Hagen, *Calotermes schwarzi*, Banks, *C. jouteli*, Snyder, *C. cubanus*, Snyder, *Nasutitermes sanchezi*, Holm., *Anoplotermes schwarzi*, Holm., and *Mirotermes hispaniolae*, Banks.

Wilson (C. E.). **Insect Pests of Cotton in St. Croix and Means of combating them.**—*Virgin Islands Agric. Expt. Sta., St. Croix*, Bull. no. 3, 20 pp., 21 figs. Washington, D.C., 19th May 1923. [Received 11th September 1923.]

With a largely increased area planted with cotton in St. Croix, the question of insect enemies of the crop has become a very important one. The chief pests are dealt with in this bulletin, in the order of their economic importance. Those attacking the leaf and stem include *Alabama argillacea* (cotton worm), against which arsenicals are recommended, and which is kept in check by birds, the predaceous beetle, *Calosoma calidum*, parasites, including *Chalcis robusta*, and other enemies; *Eriophyes gossypii* (blister mite); *Laphygma frugiperda* (fall army worm), which has the same natural enemies as *A. argillacea* and is also parasitised by the Hymenoptera, *Spilochalcis femorata*, *S. vittata*, *Henicospilus concolor*, and the Dipteron, *Exorista pyste*; *Prodenia ornithogalli* and *P. latifascia* (cutworms); *Diaprepes abbreviatus* (West Indian sugar-cane root borer), for which the remedies suggested are hand-picking and trap-crops of sunflowers; *Xylomyges sunia* (tropical cutworm), which is parasitised by *Exorista pyste* and for which dusting as for *A. argillacea* is recommended; *Aphis gossypii* (cotton aphis), which is kept in check by the Ichneumonid parasite, *Lysiphlebus testaceipes*, and the Coccinellid, *Cycloneda sanguinea*; *Corythuca gossypii* (cotton lace-bug); *Tetranychus telarius* (red spider); *Diaspis* (*Aulacaspis*) *pentagona* (West Indian peach scale); *Saissetia nigra* (black shield scale), largely parasitised by *Zalophthrix mirum*; *S. oleae* (black scale); *S. hemisphaerica*; *Aspidiotus destructor*; the mealybugs, *Pseudococcus virgatus* and *P. longispinus*, which are attacked by *Cycloneda sanguinea*; *Aletia luridula* (lesser cotton worm); *Homophaeta aequinoctialis* (spotted flea-beetle); *Heliothrips haemorrhoidalis* (greenhouse thrips); *Amphiacusta caribbea* (sick cricket); and the Sphingid moths, *Deilephila lineata*, *Protoparce rustica*, *P. sexta*, *Erinnyis alope* and *E. ello*. *Oecanthus niveus* (snowy tree-cricket) is not abundant and is beneficial rather than injurious, as both young and adults feed on Aphids.

Insects attacking the bolls and flowers include *Platyedra* (*Pectinophora*) *gossypiella* (pink bollworm), on account of which cotton-growing in St. Croix has been suspended; *Nezara viridula* (southern green stink-bug), for which hand-picking is recommended, and which is parasitised

to the extent of sometimes 93 per cent. by the Dipteron, *Trichopoda pennipes*; *Dysdercus andreae* (cotton stainer); *Heliothis obsoleta* (bollworm), parasitised by *Chalcis robusta*, *C. annulata* (?), *Spilochalcis femorata*, *S. vittata*, *Henicospilus concolor* and *Exorista pyste*; *Contarinia gossypii* (flower-bud maggot); *Heliothis virescens*, resembling *H. obsoleta* in life-history and habits; and *Pyroderces rileyi* (pink scavenger worm), and *Zenodochium citricolella*, which are only found in diseased or infested bolls and are not in themselves pests.

Insect Pests and Plant Diseases.—*Rept. Agric. Dept. Grenada*, January-December 1922, pp. 4-5. Trinidad, 1923.

Injurious insect pests in Grenada during 1922 included *Cremastogaster brevispinosa* var. *minutior*, For. (acrobat ant), found in association with mealybugs [*Pseudococcus* spp.]. All wounds on trees should be kept clean as a remedy. *Aspidiotus destructor*, Sign. (Bourbon scale) appeared in numbers only in those areas where coconut trees were windblown. *Dysdercus delauneyi*, Leth. (cotton-stainer) was very injurious to cotton in some localities. To reduce the numbers of *Diatraea saccharalis*, F. (sugar-cane moth borer), the eggs should be collected and infested canes should be cut out and used as food for stock. *Araecerus fasciculatus*, DeG. (nutmeg and mace weevil) was less prevalent than in the previous year. *Steirastoma* (*Stirastoma*) *depressum*, L. (cacao beetle) occurred chiefly along the western coast. *Nezara viridula*, L. (green bush bug) was injurious to beans and egg-plants. For mole-crickets (*Gryllotalpa* sp.) injuring lawns and egg-plants Criddle mixture is recommended. When parasol ants [*Atta*] are injurious, the nests should be destroyed with carbon bisulphide.

FABRE (A.). **La Sériciculture au Cambodge.**—*Bull. écon. Indochine*, xxvi, no. 158, pp. 65-77. Hanoi-Haiphong, January-February 1923.

One of the worst enemies of silkworms in Cambodia, Indo-China, is a Tachinid parasite. The adults emerge from the pupal stage at dawn and fly around the silkworm nursery for from six to ten hours before oviposition. The adult female lives three or four days, during which time more than 100 eggs may be laid. These are generally laid between the inner and outer skin of the silkworm and hatch in about three days, oviposition usually occurring on the older silkworms. The larva secretes an alkaline liquid that enables it to pierce the epidermis and reach the fat-body of the host and, later, emerge from the cocoon. The period occupied by the development of the larva apparently depends upon the size of the fat-body. Parasitised silkworms are generally the first to spin their cocoons. After leaving the silkworm cocoon, the parasitic larva seeks shelter in the ground or elsewhere for pupation, the adult emerging 12-25 days later, according to the temperature. Natural enemies of the parasite include spiders, birds and a small lizard, *Hemidactylus frenatus*.

A similar Tachinid, occurring at Tonkin, has been observed to be a carrier of pebrine disease of silkworms. Parasites emerging from infected larvae carry the germs of the disease with them through the adult stage, and deposit infected eggs on healthy silkworms.

Precautionary measures against the parasite include closing the doors of the silkworm nursery with fine wire mesh, or enclosing the

silkworm containers in mosquito netting. The floor should be smooth, without any cracks, so that the parasite larvae can be seen and killed in the morning when they emerge from the cocoons. The silkworm nursery should be carefully examined each morning from 6 to 9 o'clock, and any flies present should be destroyed.

CHEVALIER (A.). **Les Galles de Chine et leur origine.**—*Rev. Bot. app. & Agric. colon.*, iii, Bull. 24, pp. 513–522. Paris, 31st August 1923.

An attempt is being made in Indo-China to produce Chinese galls, which at present are imported from China into France, where they are largely used for tanning and other industries, by introducing the insect that causes them. The appearance, uses and chemical composition of the galls are described. They are produced as a result of the puncture of the winged Aphid, *Schlectendalia sinensis* in the leaf of *Rhus javanica*. It is possible that both the insect and its food-plant already occur in the higher regions of Tonkin and Laos, but if not, it should be an easy matter to rear the insect and cultivate the plant. There would undoubtedly be a good demand for the galls if they could be produced in quantities.

JUCCI (C.). **Sulla curva di sviluppo del baco da seta.** [On the Development Curve of the Silk Worm.]—*Boll. Lab. Zool. Gen. Agrar. R. Scuola Sup. Agric.*, xvi, pp. 59–136, 5 charts. Portici, 1922.

The practical conclusions obtained in this minute study of the larval growth of the silkworm [*Bombyx mori*] are that the first larval stage is of the highest importance and cannot be tended too carefully, and that the future of each stage lies in the moult preceding it, so that great care must be taken of the larva at the moulting periods.

FERRIS (G. F.). **Two new Coccidae from Cyrenaica.**—*Boll. Lab. Zool. Gen. Agrar. R. Scuola Sup. Agric.*, xvi, pp. 207–210, 2 figs. Portici, 1922.

The new species described are *Pseudococcus citrioides* and *Phenacoccus cyrenaicus*. The food-plants are not named. A key to some species closely allied to the former is given.

RAGUSA (E.). **Le Aegeridae (Sesiidae) della Sicilia.** [The Aegeriidae of Sicily.]—*Boll. Lab. Zool. Gen. Agrar. R. Scuola Sup. Agric.*, xvi, pp. 211–220. Portici, 1922.

In this list of the Aegeriid moths of Sicily, brief information regarding locality, food-plants, etc., is given.

The larva of *Aegeria apiformis*, Cl., lives for two years in the trunk and roots of *Populus tremula* and *P. nigra*. *Paranthrene tabaniformis* Rott., lives for two winters in the trunk of *Populus canadensis* and is parasitised by *Meniscus setosus*, Holmgr. *Aegeria* (*Synanthedon*) *tipuliformis*, Cl., lives for one year in *Corylus*, *Ribes*, *Juniperus* or *Euonymus*, eating the pith in the branches. *A.* (*S.*) *conopiformis*, Esp., and *A.* (*S.*) *vespiformis*, L., live two years in old oaks. *Dypsosphecia uroceriformis*, Tr., lives in the roots of *Dorcynium herbaceum*, and *D. ichneumoniformis*, F., in *Hedysarum coronarium*. *Pyropteron doryliformis* var. *icteropus*, Zell., lives in the roots of *Rumex*, and *P. chrysidiformis* var. *sicula*, Le Cerf, in those of *Rumex*

acetosa, *Artemisia campestris*, etc. *P. schmidti*, Frr., is believed to live in *Salvia verticellata*. *P. triannuliformis*, Frr., lives in *Rumex acetosella*. *Chamaesphecia leucomelaena*, Z., occurs in the roots of *Tithymalus ciparissius*, *C. corsica*, Staud., in *Rumex acetosella*, and *Zenodoxus tineiformis*, Esp., in *Echium vulgare*.

SILVESTRI (F.). **Contribuzioni alla conoscenza degli insetti del Nocciuolo.** [Contributions to the Knowledge of the Insects of the Hazel.]—*Boll. Lab. Zool. Gen. Agrar. R. Scuola Sup. Agric.*, xvi, pp. 221–301, 50 figs., 2 plates. Portici, 1922.

Details are given of the bionomics and control of four moths infesting hazel.

The Tortricid, *Gypsonoma neglectana*, Dup., has now been observed in Italy on hazel, previously known food-plants being *Populus nigra P. tremula* and *Salix caprea*. At Portici the adults appear in the first half of May and some were seen up to 20th June. They oviposit on the lower surface of the leaves. Incubation requires 5–6 days. The larva remains at first near a nervure and also mines it. Just before the leaves fall, about the end of October, leaf or flower buds are infested, and a groove is cut in the twig from the base of the bud towards the tip of the twig. In March the larva penetrates into the bud; by the middle of April healthy buds have opened while infested ones remain closed. The larva then leaves the bud and feeds on the terminal leaflets of others. In May a cocoon is spun, pupation lasting about 20 days. The damage done by *G. neglectana* is considerable if the winter mine passes through the axis of the bud.

Natural enemies noticed at Portici included 19 spiders and an ant, *Formica cinerea*, Mayr, which attacks the larvae. A Braconid, *Apanteles lictorius*, Reinh., parasitises 11–30 per cent. It oviposits in May or June in the larvae, within which its own larvae hibernate in the first larval stage even up to as late as the following May. They then develop rapidly. The host-larva spins its cocoon but is unable to pupate. The parasite forms its cocoon within that of its victim. Another Braconid, *Meteorus cinctellus*, Nees, has a similar life-cycle. The parasitism observed varied from 7 to 15 per cent. *M. cinctellus* has been recorded from other countries from larvae of *Thera juniperata*, L., and *Tortrix viridana*, L., from which latter the author also has obtained it. A third Braconid, *Macrocentrus nitidus*, Wesm., probably has a similar life-cycle, but seems a parasite of little importance. A number of examples of an Ichneumonid, *Pimpla alternans*, Grav., were obtained from pupae of *G. neglectana* in May and June. A rarer species, *P. nucum*, Ratz., deposits its egg on the body of the host larva, the complete cycle from egg to adult requiring about 20 days in May. It is known as a parasite of many other Lepidoptera, and the author has observed it parasitising *Tortrix viridana* and *Recurvaria nanella*, Hb., amongst others. A Tachinid, *Phytomyptera nitidiventris*, Rond., parasitised 34 per cent. of the caterpillars in 1908. In spite of the competition between these parasites they are able to control severe outbreaks by *G. neglectana*.

Artificial measures against the moth consist in collecting infested leaves in late September or early October, and in spring a spray containing 1 per cent. of lead arsenate paste may be used.

In the case of another Tortricid, *Eucosma* (*Epiblema*) *penkleriana*, F.R., other recorded food-plants are *Alnus*, *Betula* and *Ulmus*. The adults appear in May and begin ovipositing in the second half of

September. Incubation lasts about a month. The larva enters a leaf-bud and destroys it. If the hazel is a variety with buds opening late, the bud is abandoned at the end of February or early in March and another one is attacked. In an early variety the larva that has emerged produces an injury similar to that by *G. neglectana.* Towards mid-April the larvae begin to spin cocoons in the buds or between bud and twig. Pupation requires about a month. The larvae are parasitised by a Braconid, *Eubadizon extensor*, L., and an Ichneumonid, *Pimpla nucum*, Ratz. *E. extensor* has previously been recorded as a parasite of numerous Lepidoptera. It must have several generations a year, the first from *Eucosma*, the second from *Tortrix viridana*, and at least a third from Lepidoptera with aestivo-autumnal larvae, unless the adults await species with a life-history similar to that of *Eucosma*. It is a general European species. Artificial control is limited to collecting the moths before oviposition takes place.

Another Tortricid, *Eucosma* (*Tmetocera*) *ocellana*, F., occurs in central and southern Europe (except Greece) and has been introduced into the United States and Canada. The author bred adults from 13th May to 22nd June. They oviposited about three days after emergence, usually on the upper side of the leaves. Incubation required 6-7 days. The young larva moves to the lower surface of the leaf and feeds on the parenchyma, leaving the epidermis of the upper surface and the nervures. During the summer it shelters between two leaves bound together. At the end of October it enters a small nest, covered with silk and small pieces of bark and placed at the base of a bud or in cracks on the twigs. At the end of March it goes to the apical leaflets of the shoots and binds them into an irregular case, in which it feeds on the parenchyma. In April and May part of the leaves and the axis of the shoot are attacked so that the distal portion of the shoot withers. Pupae begin to appear in the first half of May, and pupation lasts about 17 days. No great harm is done in summer, but in autumn and winter the excavation of the nests may injure the buds, while in spring the tips of the buds may be cut. At Avellino *E. ocellana* has not been observed in sufficient numbers to be of importance. In Italy it is common on apple. The only parasite hitherto recorded from Europe is *Apanteles xanthostigma*, Hal., but the author has obtained the following Hymenoptera at Avellino :—CHALCIDIDAE : *Chalcis intermedia*, Nees. BRACONIDAE : *Microdus dimidiator*, Nees, which oviposits at the end of June or early in July, infesting 15–18 per cent. of the host ; *Meteorus parvulus*, Thoms., which was obtained from larvae of *E. ocellana* at the end of May and early in June ; *Habrobracon genuensis*, Marsh., which infested about 10 per cent. of the last stage larvae in 1922. ICHNEUMONIDAE : *Pimpla nucum*, Ratz., infesting up to 5 per cent. of the larvae, and *P. alternans*, Grav., taken from two pupae. PROCTOTRUPIDAE : *Parasierola gallicola*, Kieff., which lays from one to eight eggs on the larva of *E. ocellana*, and has a life-cycle of only 20 days in spring and 12 in summer, so that it may prove of value. All these natural enemies render *E. ocellana* an unimportant pest of hazel. In case of an outbreak the collection of curled leaves containing larvae and pupae may be very useful if the parasites are permitted to escape. Spraying with lead arsenate in April for hazel and later for apple, etc., may also be tried.

The Gelechiid, *Recurvaria nanella*, Hb., is recorded from hazel apparently for the first time. At Portici the adults appear in mid-May, decreasing in early June. The eggs are laid on the lower surface

of the leaves, and the larva mines the parenchyma. In October the larvae move to the twigs, seeking a shelter for the winter nest, and in December, January and February they were found at the bases of buds. At the end of March or early in April they have mined into the axis of the shoot, which then withers completely. Early in May pupae are to be found in the cocoon at the base of the mine or between curled leaves. Parasites of this moth included a Braconid, *Microdus rugulosus*, Nees, a Chalcid, *Copidosoma nanellae*, sp. n., a small undetermined *Apanteles*, *Parasierola gallicola*, and a Dipteron. The adults of *M. rugulosus* were obtained in June, *i.e.*, when newly hatched larvae of *Recurvaria nanella* are present. Its habits seem to resemble those of *M. dimidiator*. Infestation by it up to 20 per cent. has been noticed. The adults of *Copidosoma nanellae* emerge from the host-larva in numbers varying from three to eleven from the end of May to mid-June. The female oviposits in the egg of *R. nanella*. The parasitic egg is polyembryonic and produces up to eleven normal parasitic larvae and three or four aborted ones. The normal individuals attain maturity in May of the following year and form parchment-like cocoons in the mummified host-larva. In 1919, 35 per cent. of the larvae were parasitised. *R. nanella* is thus well controlled by its natural enemies.

VECCHI (A.). **Influenza dell'alimentazione con** *Maclura aurantiaca* **sul Baco da seta.** [The Effect of Feeding Silkworms on *M. aurantiaca*.] —*Boll. Lab. Zool. Gen. Agrar. R. Scuola Sup. Agric.*, xvi, pp. 302–313. Portici, 1922.

Maclura aurantiaca, which is a thorny plant well suited for hedges, may be usefully substituted for mulberry for feeding the first three larval stages of silkworms [*Bombyx mori*].

ESCHERICH (K.). **Die Forstinsekten Mitteleuropas. Neuauflage von Judeich-Nitsche, Lehrbuch der mitteleuropäischen Forstinsektenkunde. Bd. II.** [The Forest Insects of Central Europe. (A New Edition of Judeich & Nitsche's Textbook of Central European Forest Entomology.) Vol. II.]—viii + 663 pp., 335 figs. Berlin, Paul Parey, 1923. Price 18 shillings.

The first volume of this work, which appeared in 1914, dealt with the structure and physiology of insects and contained a general account of injuries to plants and the various methods in use against insect pests.

The present volume is the first of the series dealing with specialised forest entomology. It briefly discusses the Orthoptera, but practically the whole volume deals with the various families of Coleoptera, each being considered under its systematic and economic aspects. Copious lists of references, a profusion of illustrations, and good indices are features of the work. As regards nomenclature Dr. Escherich has kept to established names in many cases where reasons of particular importance do not compel a change. The book should prove most valuable to the practical forester, the scientific zoologist and the economic entomologist.

FORBES (W. T. M.). **Trap-lantern Record at Ithaca, New York (Lepidoptera).**—*Canad. Ent.*, lv, nos. 7 & 8, pp. 151–158 & 176–184, 5 plates. Orillia, Ont., July and August 1923.

This paper gives seasonal records at Ithaca for the commoner species of Lepidoptera taken at light in a trap during 1919 and 1922, including the following species of economic importance:—*Diacrisia virginica*, F., *Estigmene acraea*, Drury, *Feltia subgothica*, Haw., *Agrotis c-nigrum*, L., *Polia* (*Mamestra*) *renigera*, Steph., *Cirphis unipuncta*, Haw., *Apamea nictitans*, L., *Plathypena scabra*, F., *Datana ministra*, Drury, *D. integerrima*, Grote & Robinson, *Heterocampa guttivitta*, Wlk., *Hemerocampa leucostigma*, A. & S., *Ennomos subsignarius*, Hb., *Desmia funeralis*, Hb., *Evergestis straminalis*, Hb., *Phlyctaenia ferrugalis*, Hb., *P. terrealis*, Treit., a number of species of *Crambus*, *Argyroploce hebesana*, Wlk., *Tortrix* (*Cacoecia*) *argyrospila*, Wlk., *T.* (*C.*) *rosaceana*, Harris, and *Eulia velutinana*, Wlk.

Modification of Gipsy Moth and Brown-tail Moth Quarantine. Amendment No. 4 to Regulations Supplemental to Notice of Quarantine No. 45.—*U.S. Dept. Agric., Fed. Hortic. Bd.*, 4 pp. Washington, D.C., 6th June 1923.

This amendment revises the infested areas on account of the gipsy moth [*Porthetria dispar*] and the brown-tail moth [*Nygmia phaeorrhoea*], supersedes all previous amendments to regulations supplemental to Notice of Quarantine No. 45 [*R.A.E.*, A, x, 275, 595] and became effective on 1st July 1923.

Fruit and Vegetable Quarantine. Notice of Quarantine No. 56, with Regulations.—*U.S. Dept. Agric., Fed. Hortic. Bd.*, 8 pp. typescript. Washington, D.C., 1st August 1923.

To prevent the introduction of certain injurious insects, including fruit and melon flies (TRYPETIDAE), the importation from all foreign countries of fruits and vegetables and of plants used as packing material for them, except under certain regulations, is prohibited, as from 1st November 1923. This replaces Quarantine No. 49 with Regulations.

Modification of Gipsy Moth and Brown-tail Moth Quarantine. Amendment No. 5 to Regulations Supplemental to Notice of Quarantine No. 45.—*U.S. Dept. Agric., Fed. Hortic. Bd.*, 2 pp. Washington, D.C., 21st August 1923.

This amendment deals with the conditions governing inspection and movement of plants and became effective 21st August 1923.

MERRILL (G. B.) & CHAFFIN (J.). **Scale-insects of Florida.**—*Qtrly. Bull. Florida State Pl. Bd.*, vii, no. 4, pp. 178–298, 100 figs. Gainesville, Fla., July 1923.

An account is given of the Coccids of Florida, numbering 70 species of armoured scales, 26 soft scales and 30 species of mealybugs. A short description is given of each, with their food-plants, distribution, etc., with references to the literature in many cases.

Quarantine Department.—*Qtrly. Bull. Florida State Pl. Bd.*, vii, no. 4, pp. 300–304. Gainesville, Fla., July 1923.

The most important interception during the quarter ending 30th June 1923 was that of *Anastrepha* (*Trypeta*) *ludens*, Lw. (Mexican orange maggot), discovered in oranges from Mexico. This is the first interception of this dangerous fruit-fly in Florida; it is a serious pest of *Citrus* and many other fruits.

Weigel (C. A.) & Doucette (C. F.). **The Strawberry Rootworm as an Enemy of the Greenhouse Rose.**—*U.S. Dept. Agric.*, Farmers' Bull. 1344, 14 pp., 14 figs. Washington, D.C., July 1923.

The bulk of the information contained in this bulletin on *Typophorus* (*Paria*) *canellus* has already been noticed [*R.A.E.*, A, xi, 412].

Back (E. A.). **Carpet Beetles and their Control.**—*U.S. Dept. Agric.*, Farmers' Bull. 1346, 13 pp., 13 figs. Washington, D.C., July 1923.

Household fabrics, wool, hair, feathers, fur and silk are frequently damaged in the United States by carpet beetles, which include *Attagenus piceus*, Oliv., *Anthrenus scrophulariae*, L., *A. verbasci*, L., *A. fasciatus*, Hbst., *A. museorum*, L., and *A. lepidus*, Lec., the first four of which are serious household pests. An account is given of the life-history and seasonal appearance of these, and many remedial and preventive measures are recommended [*R.A.E.*, A, vi, 533]. In cases of serious infestations, thorough fumigation with hydrocyanic-acid gas, under the direction of an expert, is advocated; carbon bisulphide, or carbon tetrachloride, which are particularly useful for articles stored in trunks, chests, etc., may also be used.

Williams (C. G.). **41st Annual Report of the Ohio Agricultural Experiment Station for the Year ended June 30, 1922.**—59 pp., 6 figs. Wooster, Ohio, 1922. [Received 19th September 1923.]

Pages xxix to xxxv of this report are devoted to the work in connection with insect pests. The average infestation by Hessian fly [*Mayetiola destructor*, Say] was found to be 17 per cent. as against 44 per cent. in 1920, observations further confirming the close relation between the time of sowing and the percentage of infestation. In the southern and south-western counties of Ohio the wheat midge [*Sitodiplosis mosellana*, Geh.] caused severe damage to the crops of 1922; this pest, and chinch bugs [*Blissus leucopterus*, Say] in the north-western districts, are expected to be most injurious in 1923. The European corn-borer [*Pyrausta nubilalis*, Hb.] is reported from several additional townships, though no commercial damage has yet been done.

Experiments with a preparation of derris (1–1,200) show it to be less effective than nicotine sulphate (one teaspoonful to the gallon of soapy water) for the control of Aphids. Nicotine as a dust proved more effective than spraying with liquids against Aphids on apple.

The overwintering eggs of *Paratetranychus pilosus*, C. & F., may be destroyed by applying miscible oil in the spring.

The use of aeroplanes in applying dusts to tall trees [*R.A.E.*, A, x, 277] is discussed.

BOYCE (J. S.). **The Deterioration of Felled Western Yellow Pine on Insect-control Projects.**—*U.S. Dept. Agric.*, Dept. Bull. 1140, 7 pp., 1 graph. Washington, D.C., 29th March 1923. [Received 20th September 1923.]

Serious epidemics of *Dendroctonus brevicomis*, Lec. (western pine beetle) and *D. monticolae*, Hopk. (mountain pine beetle) have occurred during the last 15 years in the Western United States on various species of pine and have necessitated extensive remedial measures. In particular, felling and barking of infested trees has been practised. In the southern Oregon and north Californian region, as a result of these operations, some 16,000,000 feet board measure of merchantable timber has been felled, and during the next three or four years an additional 20,000,000 feet will probably be involved. These trees must be left on the ground until they can be treated by logging operations. A survey has therefore been made to determine the rate of deterioration of this felled timber. While several species of fungus were found to cause deterioration, the loss due to wood-boring insects was negligible. Scolytid beetles did not attack the trunk from which the bark had been removed, and Cerambycid and Buprestid borers did not attack the trees until sap-rot was established in them.

Tanganyika Territory: Plant Pest and Disease (Import) Regulations, 1923. Government Notice No. 159.—2 pp. Dar es Salaam, 27th July 1923.

No living plants may be imported into Tanganyika Territory without a permit from the Director of Agriculture. In the case of seeds this only applies to coffee (except coffee beans intended for human consumption) and cotton. The importation of coffee plants, the plants of any stone fruits, apple and pear stocks, seed potatoes, citrus plants or fruits (except citrus fruit grown in Zanzibar or Pemba) and sugar-cane cuttings is prohibited, unless facilities exist for examination and treatment. Any plant or packing found infested with any pest or disease may be treated or destroyed without compensation.

[Johore:] Agricultural Pests Enactment, 1921. Rules, No. 18.—2 pp.

No plants of para rubber [*Hevea brasiliensis*] or of sugar-cane may be introduced into the State of Johore without the written permission of the Inspector of Agriculture except under certain conditions. The infestation of coconut palms by *Brachartona catoxantha*, Hmps., and of para rubber by disease caused by various fungi, must be notified within a specified time.

KARNY (H. H.). **Beitraege zur Malayischen Thysanopterenfauna. vi–viii.** [Contributions to the Malayan Thysanopterous Fauna. vi–viii.]—*Treubia*, iii, no. 3–4, pp. 277–380, 54 figs., 1 plate. Buitenzorg, 1923.

These papers include descriptions of 26 new species including:— Bark thrips: *Macrophthalmothrips quadricolor* from *Ficus*; *Brachythrips bogoriensis*, *Dinothrips kemneri* and *D. anodon* from *Albizzia*; and *Dolerothrips uncilumbis* and *Diaphorothrips hamipes* from *Citrus*. Gall thrips: *Taeniothrips taeniatus* in the leaf-galls of *Gynaikothrips*

uzeli, Zimm., on *Ficus retusa*; *Physothrips thunbergiae* from *Thunbergia fragans*; *Dolerothrips trachypogon* from *Diospyros maritima*; *Gynaikothrips pallicrus* from *Vitis lanceolaria*; *G. leeuweni* from *Pavetta indica*; *G. lividicornis* from an undetermined plant; *Leeuwenia caelatrix* and *L. aculeatrix* from *Eugenia* sp.; and *Gynaikothrips dactymon* in the leaf-galls of the last-named species.

CHATTERJEE (N. C.). **Forest Entomology.**—Reprint from *Ann. Rept. Bd. Scientific Advice for India, 1921–22,* 3 pp. [Calcutta], 1923.

In continuation of the work on *Hoplocerambyx spinicornis* previously recorded [*R.A.E.*, A, x, 369] the percentage of loss in the sal [*Shorea robusta*] trees of Dehra Dun has considerably decreased in consequence of the adoption of the remedial measures suggested [*R.A.E.*, A, ix, 216]. Under all conditions of rainfall, the distribution of attack was found to be uniform throughout the girth classes. Experiments on the correlation of rainfall and periodic emergence of the borer were repeated and confirmed previous results. Dry conditions were found to be unfavourable to development of the borer, and anything below 60 per cent. relative humidity was fatal. Very wet conditions were found to be less favourable; the limits of optimum conditions have not yet been determined.

In the evergreen forests in Assam, trees like *Vatica lanceaefolia* and *Dipterocarpus pilosus* are attacked by almost all the shot-hole borers that occur in *Shorea robusta* in Bengal and North-West Assam. In the drier dipterocarp forests, with fewer species of trees, such bark-beetles as *Diapus furtivus* and *Platypus solidus* become the dominant pests. A survey of dead trees led to the unexpected conclusion that the living tree is commonly subject to attack by insects of the bee-hole borer type, which damage the tree without seriously affecting its vitality.

GRAM (E.) & ROSTRUP (S.). **Oversigt over Sygdomme hos Landbrugets og Havebrugets Kulturplanter i 1922.** [Plant Diseases and Pests in Denmark in 1922.]—*Tidsskrift f. Planteavl,* xxix, pp. 236–309. Copenhagen, 1923. [With a Summary in English.]

Phyllotreta nemorum and other flea-beetles rendered re-sowing necessary in many localities. Experimental spraying with nicotine sulphate (0·1 per cent.) and with lead arsenate (0·2 per cent.) had good effects. The larvae of *Ceuthorrhynchus quadridens* were rather injurious to swedes. *Meligethes aeneus* destroyed a large part of the swede seed crop and several cruciferous crops. Tarred paper disks and two waterings with a 0·1 solution of corrosive sublimate successfully checked the larvae of *Phorbia* (*Chortophila*) *brassicae.* Carrot leaf-curl due to *Trioza viridula* occurred to some extent in Jutland. In some places the larvae of *Luperina* (*Apamea*) *testacea* damaged some meadow fescue (*Festuca elatior*) grown for seed, and injured a barley field The migration to grass-roots of *Siphonaphis padi,* L. (*Aphis fitchi,* Sanderson) was proved experimentally. Attacks of *Xyleborus* (*Xyloterus*) *dispar* on fruit trees are reported for the first time in Denmark. The larvae of the sawflies, *Hoplocampa testudinea* and *H. fulvicornis,* were unusually numerous in apples, pears and plums. Apple shoots were attacked by the larvae of *Blastodacna putripenella. Cydia* (*Carpocapsa*) *pomonella, Eucosma* (*Olethreutes*) *ocellana, Cheimatobia boreata* and *C. brumata* were numerous on apple, and in one locality the last named also on black

currant. *Anthonomus rubi* was very injurious to strawberries and locally to raspberries. *Oxygrapha* (*Acalla*) *comariana* seriously infested strawberries near Copenhagen. *Pteronus* (*Nematus*) *ribesii* defoliated gooseberry bushes in several localities; the newly hatched larvae were instantly killed by a spray of tobacco extract (0·2 per cent.).

Dianthus was injured by *Thrips* sp. and the larvae of *Hylemyia cardui.*

Spray injury on apple and rose was caused by a solution of 2 per cent. Burgundy mixture plus 0·05 per cent. Paris green, and on pear by 0·5 per cent. formalin. A tobacco extract containing free ammonia caused total defoliation

Work in Connexion with Insect and Fungus Pests and their Control.—*Rept. Agric. Dept. St. Kitts-Nevis, 1921–22*, pp. 15–18 and 34–35. Barbados, 1923.

In St. Kitts no actual damage was done by the caterpillars of *Alabama argillacea* as they were kept under control by the use of Paris green and lime. Cotton-stainers [*Dysdercus*] were slightly injurious towards the end of the season. Owing to the close season for cotton and the destruction of a large number of native food-plants, the leaf-blister mite [*Eriophyes gossypii*] appears to be decreasing. The measures adopted in previous years for the control of *Platyedra* (*Pectinophora*) *gossypiella* [*R.A.E.*, A, x, 490] have been continued, and the observations of the past two seasons indicate the possibility of growing remunerative crops even with the presence of this pest provided that the same measures are rigidly carried out.

In Nevis *P. gossypiella* occurred throughout the Island towards the end of the crop, and a law has now been passed that all seed whether for shipment or planting must be fumigated daily at the ginneries as it comes from the gin. *A. argillacea* was very injurious owing to neglect of control measures, and cotton-stainers were more prevalent.

No serious outbreaks of sugar-cane pests occurred.

Cotton Protection Ordinance, 1923.—6 pp. Kingstown, St. Vincent, 1923.

Under this Ordinance the Governor in Council has the power to prescribe a close season every year for cotton, by the first day of which all cotton plants must be buried or destroyed. He may declare any area of land to be an infested area and may order compensation to be paid for plants or trees destroyed when he thinks fit. The Agricultural Superintendent and Inspectors may enter upon any land and take measures for the eradication of the cotton-stainer [*Dysdercus delauneyi*], including the burning of any old cotton left uncleared.

A schedule is added of six ordinances repealed.

SWINGLE (D. B.), MORRIS (H. E.) & BURKE (E.). **Injury to Foliage by Arsenical Spray Mixtures.**—*Jl. Agric. Res.*, xxiv, no. 6, pp. 501–537, 1 plate. Washington, D.C., 12th May 1923.

The authors' summary of this paper, based on 10 years' work with various arsenical spray mixtures to some 10,000 plants and branches of trees, is as follows:—

The name commonly used does not indicate the composition of an arsenical with sufficient exactness. This is especially true of the

calcium arsenites, lead arsenates and zinc arsenites, in which the results obtained by using different lots labelled the same except as to manufacturer may give widely divergent results. The arsenic trioxides and Paris greens are much more uniform in composition. The arsenical insecticides least injurious to foliage are iron [ferrous] arsenate and certain of the lead arsenates. Possibly new ones will be proposed that will be as safe or safer. Of the lead arsenates not all pure diplumbic ortho-lead arsenates are identical in burning properties, nor are all triplumbic ortho-lead arsenates identical in this respect. Some diplumbic lead arsenates are as safe to use as some of the triplumbic ones. Arsenic trioxide is not so dangerous to the foliage as is generally supposed, and indeed this compound is permissible as an insecticide on any but the most delicate foliage, provided it is applied promptly after mixing with water. Standing after mixing causes a very marked increase in injury by arsenic trioxide, and a slight increase in injury by other arsenical insecticides. Of the readily soluble arsenical compounds cacodylic acid and sodium and potassium cacodylates proved the most injurious. This is quite in contrast to the well recognised fact that these compounds of arsenic are less harmful to the higher animals than most others. The foliage is more susceptible to arsenical injury than the fruit or the stems. The injury to leaves is characterised, first, by a lack of lustre, then wilting, and a final change to some shade of brown (dependent upon the species of plant) as the affected tissue becomes dead and brittle. The symptoms are not sufficiently distinctive to separate arsenical injury from some others. The injury to the foliage is practically all through the lower epidermis, regardless of the numbers of stomata in the two surfaces, indicating that it is a result of direct penetration of the thinner cuticle. Individual plants of the same species and variety vary somewhat in their susceptibility to arsenical injury. The older leaves of a plant are more susceptible than the younger ones. Soap added to soluble arsenicals offers a slight protective action. Soap added to most insoluble arsenicals increases the injury by increasing the solubility to a point more than counteracting its slight protective action. Soap added to Paris green in suspension distinctly restrains the burning of foliage. Gelatine, milk and agar do not increase the arsenical injury to foliage. Lime-sulphur increases the injury caused by most insoluble arsenical compounds. Lime-sulphur distinctly decreases the injury caused by calcium arsenite but not to a sufficient extent to make this a safe insecticide. Tobacco extract has little influence on the injurious properties of arsenical insecticides. Lime restrains, to some extent, the injury by calcium arsenite and Paris green. Zinc arsenite injury was not decreased by adding ferrous sulphide. Repeated spraying with zinc arsenite is liable to result in serious burning. A slightly wilted condition of the foliage does not result in increased injury. Light seems not to be an important factor in arsenical injury to foliage. An increase in atmospheric temperature results in a moderate increase in arsenical injury; but within the ranges of temperature found during the summer in a suitable orchard climate this is of little practical importance if the air is relatively dry. Humidity is the greatest environmental factor in determining arsenical injury to foliage, and this influence is very marked even before the saturation point is reached. Using a few experiments as a basis for generalisation upon arsenical injury may lead to erroneous conclusions. The only safe procedure is to test repeatedly each point under consideration.

Wille (J.). **Biologische und physiologische Beobachtungen und Versuche an der Käsefliegenlarve** (*Piophila casei*, **L.**). [Biological and Physiological Observations and Experiments on *P. casei*.]—*Zool. Jahrb.*, Abt. Allg. Zool. & Phys., xxxix, no. 3, pp. 301–320, 4 figs. Jena, 1923.

This paper deals with the movements of the larva of *Piophila casei* and the influence of light, moisture and varied temperature.

Importation au Maroc des pommes de terre, des fruits et des légumes frais de provenance algérienne.—*Rev. agric. Afr. Nord*, xxi, no. 215, p. 588. Algiers, 11th September 1923.

From the 1st September 1923 potatoes, fruit and fresh vegetables of Algerian origin are forbidden entry into Morocco unless accompanied by a certificate of inspection. These precautions are intended to prevent the introduction of dangerous pests, especially *Icerya purchasi* and *Chrysomphalus dictyospermi pinnulifera* (*minor*).

La Fourmi d'Argentine en Algérie.—*Rev. hortic. Algérie*, xxvii, no. 7, pp. 139–140. Algiers, August–September 1923.

Iridomyrmex humilis (Argentine ant) has recently been intercepted in Algeria in consignments of fruit. The danger of introducing this pest, and the consequent need for careful inspection of all fruit and vegetable products originating from infested countries is pointed out. It is urged that the existence of the pest should be reported immediately upon its discovery.

Howard (C. W.). **The Sericulture Industry of South China.**—*Canton Christian Coll., Coll. Agric.*, 32 pp., 4 plates. Canton, January 1923.

An account is given of the various phases of sericulture in South China, closing with a chapter on improving the industry.

Arisz (W. H.). **Verslag over het Jaar 1922.** [Report of the Besoeki Experiment Station for 1922.]—*Meded. Besoekisch Proefst.*, no. 34, 73 pp. Djember, 1923.

Spraying with a solution of lead arsenate and soap sufficed to keep the tobacco seed-beds free from Lepidopterous larvae in Java, though where *Dausara talliusalis* occurred it was necessary to push aside the web before applying the spray. The breeding of Coccinellid beetles for combating the white coffee scale [*Pseudococcus crotonis*] has been continued. The pest has not been harmful this year, but whether this was due to the beetles is not known. The measures advised against the coffee berry borer [*Stephanoderes hampei*] are those usually advocated against this pest [*R.A.E.*, A, xi, 236, 240, 354, 464].

Drenowski (A. K.). *Lasiosina cinctipes* (**Meig.**) (**Dipt.**), **die Gerstenfliege, ihre Schäden und Bekämpfung in der Umgegend von Sofia, Bulgarien.** [*L. cinctipes*, the Barley Fly; its Injurious Effects and Control near Sofia, Bulgaria.]—*Zeitschr. wiss. Insektenbiol.*, xviii, no. 10–11, pp. 284–289, 5 figs. Berlin, 1st October 1923.

This extract from the author's original in the *Bull. Landwirtsch.-Ministerium*, Sofia, 1923, no. 3–4 describes in detail the injury to

barley by the Chloropid, *Lasiosina cinctipes*, Mg., which consists of a shortening of the uppermost haulm joint and a rotting of the ear owing to its infestation by the larvae. The measures against this serious pest are not given in the summary.

FREMLIN (H. S.). **The growing Importance of Entomology.**—*Ent. Record & Jl. Var.*, xxxv, no. 9, pp. 136–139. London, September 1923.

The relation of insects to plant life and diseases both of animals and plants is pointed out, and the need for the thorough training of workers in this important branch of science is emphasised.

MARSHALL (G. A. K.). **On New Species of Curculionidae from India (Coleoptera).**—*Ann. & Mag. Nat. Hist.*, xii, no. 69, pp. 281–300, 1 plate. London, September 1923.

The species described include *Lixocleonus incanus*, gen. et sp. n., the larvae of which feed on the roots of *Lannea asplenifolia*, on which they form elongate cocoons, the adults having been observed on grasses, sugar, maize and cotton, though there is no indication of any damage by them; and *Hedychrous rufofasciatus*, gen. et sp. n., recorded from various plants such as jute, ginger, rice and sweet potato, though there is no information as to its doing any damage.

LYLE (G. T.). **New Parasitic Hymenoptera.**—*Ann. & Mag. Nat. Hist.*, xii, no. 69, pp. 337–339. London, September 1923.

The new species described include *Chelonus rufus* bred from cocoons found on cotton believed to be those of *Earias* sp., and from *Laphygma exigua* on lucerne, both from the Punjab, and *C. rugulosus* bred from cotton-bolls infested with pink bollworm [*Platyedra gossypiella*] from Fiji.

UVAROV (B. P.). **A Revision of the Old World Cyrtacanthacrini (Orthoptera, Acrididae). III. Genera** *Valanga* **to** *Patanga*.—*Ann. & Mag. Nat. Hist.*, xii, no. 70, pp. 345–367. London, October 1923.

This is the third section of this revision [*R.A.E.*, A, xi, 257].

FOX-WILSON (G.). *Otiorrhynchus picipes*, **F., and** *Strophosomus coryli*, **F., attacking Rhododendrons, and** *Xyleborus dispar*, **F., destroying Red-currant Bushes.**—*Ent. Mo. Mag.*, lix, p. 200. London, September 1923.

Rhododendrons in Surrey have been severely attacked by *Otiorrhynchus picipes*, F., and *Strophosomus coryli*, F., at the end of May and beginning of June, preference being shown for *Rhododendron ponticum* and *R. basilicum*. A red currant bush was killed by *Xyleborus dispar*, F., and this Scolytid is apparently becoming a general feeder.

ALDRICH (J. M.). **Descriptions of Lantana Gall-fly and Lantana Seed-fly (Diptera).**—*Proc. Hawaiian Ent. Soc. 1922*, v, no. 2, pp. 261–263. Honolulu, September 1923.

Both sexes of *Eutreta xanthochaeta*, sp. n. (lantana gall-fly) and *Agromyza lantanae*, Frogg. (lantana seed-fly) are described from the Hawaiian Islands.

SWEZEY (O. H.). **The Erythrina Twig-Borer** (*Terastia meticulosalis*) **in Hawaii (Pyralidae, Lepidoptera).**—*Proc. Hawaiian Ent. Soc. 1922*, v, no. 2, pp. 297–298. Honolulu, September 1923.

Terastia meticulosalis, Guen., has been reared from pupae found in pods of *Erythrina monosperma* in Hawaii, this being the first record of this moth from these Islands. Its distribution elsewhere is briefly reviewed.

The Phycitid, *Myelois ceratoniae*, L., is also recorded from the same food-plant in Hawaii.

SWEZEY (O. H.). **Records of Introduction of Beneficial Insects into the Hawaiian Islands.**—*Proc. Hawaiian Ent. Soc. 1922*, v, no. 2, pp. 299–304. Honolulu, September 1923.

An attempt is here made to collect all the available records of successful introductions of beneficial insects into the Hawaiian Islands, grouping them according to the various purposes for which they were introduced.

FULLAWAY (D. T.). **Notes on the Mealy-bugs of Economic Importance in Hawaii.**—*Proc. Hawaiian Ent. Soc. 1922*, v, no. 2, pp. 305–321, 1 plate. Honolulu, September 1923.

It is believed that all the mealy-bugs of economic importance have at some time or other been introduced into Hawaii. As comparatively few of them are attacked by parasites, the introduction of those occurring elsewhere is suggested as a possible means of keeping them in check. The paper deals with 16 species of mealy-bugs including notes on their bionomics as well as keys to the subfamilies, genera and species occurring in Hawaii.

They include the pink mealy-bug formerly recorded as *Pseudococcus calceolariae*, Mask., which is now believed to be *Trionymus* (*P.*) *sacchari*, Ckll., and is a pest of considerable importance occurring behind the leaf-sheath of sugar-cane. The insect, formerly misidentified as *P. sacchari*, Ckll., and *P. saccharifolii*, Gran., is now considered to be the true *T.* (*P.*) *calceolariae*, Mask., and is redescribed and figured.

Pseudococcus brevipes, Ckll., formerly recorded as *P. bromeliae*, Bch., has become widely distributed with the transference of plants from one region to another and occurs on pineapple, bananas, etc., but apparently does not flourish outside the tropics. *P. nipae*, Mask., is a serious agricultural and horticultural pest, against which three species of Coccinellids, two Encyrtids, and one Scelionid have recently been introduced into Hawaii. *P. filamentosus*, Ckll., is a great hindrance to citrus culture in Hawaii, causing malformation of the terminal growth.

P. kraunhiae, Kuw., which is thought unlikely to be a synonym of *P. citri*, Risso, is heavily parasitised by *Tanaomastix* (*Leptomastidea*) *abnormis*, *Pauridia peregrina* and other polyphagous mealy-bug enemies. *P. adonidum*, L. (*longispinus*, Targ.) is especially a greenhouse pest, flourishing in a warm, still, moist atmosphere. *Tylococcus giffardi*, Ehrh., occurs on *Pandanus odoratissimus*, which grows wild in Hawaii, several forms of it being cultivated as ornamental plants. *Ripersia palmarum*, Ehrh., is commonly found on ornamental palms, on which it is difficult to control.

The new genus *Ferrisia* is erected for *Pseudococcus virgatus*, Ckll., a tropical species with a wide distribution.

TIMBERLAKE (P. H.). **Descriptions of two New Species of Encyrtidae from Mexico reared from Mealy-bugs (Hym., Chalcidoidea).**—*Proc. Hawaiian Ent. Soc. 1922*, v, no. 2, pp. 323–333, 1 fig., 1 plate. Honolulu, September 1923.

The Encyrtids described were discovered in Mexico in the course of explorations for natural enemies of mealy-bugs with a view to their introduction into Hawaii.

Pseudaphycus utilis, sp. n., is a parasite of *Pseudococcus nipae*, Mask., and is now established at Honolulu. *Coelaspidia osborni*, gen. et sp. n., has not been recovered as yet, though liberated in large numbers. In Mexico this species was reared from *Pseudococcus calceolariae*, Mask., on sugar-cane, at Honolulu it was bred in part from the same host and also from *P. sacchari*, Ckll., and *P. kraunhiae*, Kuw.

FRANK (A.). **The European Earwig.**—*Bi-Mthly. Bull. Western Washington Expt. Sta.*, xi, no. 3, pp. 55–56, 1 fig. Puyallup, Wash., September 1923.

Owing to the continued spread of the European earwig [*Forficula auricularia*, L.] since 1915 as a pest of houses and gardens, a brief account is here given of its life-history and habits, and recommendations are made for its control. The latter include traps, spraying, and poison baits. Of these a poison bait consisting of about 15–20 lb. of bran and 1 lb. of Paris green with sufficient water to form a wet mash has given the best results. It should be applied at dusk.

DELASSUS (—). **La lutte contre les Courtilières dans les jardins maraîchers de Fort-de-l'Eau (Alger).**—*Rev. agric. Afr. Nord*, xxi, no. 216, pp. 603–606, 4 figs. Algiers, 21st September 1923.

The mole-cricket, *Gryllotalpa gryllotalpa* (*vulgaris*), causes great damage to potatoes grown for the Algiers market. A defence syndicate was formed, and under its instruction carbon bisulphide, about 700 to 1,200 lb. to the acre, was injected into the fields, resulting in a mortality of 75 to 90 per cent. of the crickets. Two applications, with an interval of a few days, gave the best results.

Departmental Activities. Entomology.—*Jl. Union S. Africa Dept. Agric.*, vii, no. 3, pp. 198–199, 1 fig. Pretoria, September 1923.

Cocoons of the codling moth [*Cydia pomonella*] from Cape Province have been found to contain Nematodes that had eaten the moth larva and then been unable to make their way out of the cocoon. They proved to be a species of *Mermis*, a genus that has been known to infest and kill the larvae of *C. pomonella* in the United States.

Citrus trees were seriously damaged during June and July by locusts, particularly *Locustana pardalina* (*Pachytylus sulcicollis*), probably because green grasses, which are the usual food, were scarce. Although the fruit was not touched, the trees were defoliated in many cases. Where possible, smudge fires were kept up for weeks, and succeeded in repelling the insects.

Worrall (L.). **Jassid-resistant Cottons.**—*Jl. Union S. Africa Dept. Agric.*, vii, no. 3, pp. 225–228, 2 figs. Pretoria, September 1923.

During 1922–23, cotton practically wherever grown in the Union of South Africa was attacked by the Jassid, *Chlorita fascialis*, Jac., which was very abundant, owing probably to the favourable weather conditions. Excessive rain and dull, cloudy weather seem to encourage its spread. Experiments indicate that cotton is always attacked at a certain stage of its growth, and the infestation passes unnoticed until the plant is nearly mature The infested foliage changes colour, but the plant does not seem to be materially affected before the first bolls open. A heavy shedding of almost fully matured bolls is probably due to other factors besides Jassid attack. A study of the different varieties has shown that the smooth Egyptian and Sea Island varieties are more susceptible to Jassid attack than the hairy types, but as there is a correlation between hairiness and short staple, care should be taken to select only hairy plants with a good staple.

Lounsbury (C. P.). **Thrips Injury to Citrus Fruits.**—*Jl. Union S. Africa Dept. Agric.*, vii, no. 3, pp. 243–249. Pretoria, September 1923.

A good deal of damage is done to citrus fruit in South Africa by a species of thrips that is not the same as the one that does similar damage in California [*Scirtothrips citri*]. During 1923 the injury was particularly severe; in dry areas, after a spell of hot, dry weather the thrips are always most troublesome, and when the new growth on the trees hardens, the insects attack the fruit.

It can only be decided from experience over a number of years whether or not suppression of this thrips in South African orchards is worth the expense in the average season. The remedies employed in California are described, chiefly from articles previously noticed [*cf. R.A.E.*, A, iii, 585; vi, 218, 450, etc.]. It is suggested that nicotine dusts should not be tried in South Africa until they have been improved upon or tested sufficiently to warrant their use in that country. The use of oil sprays, on the other hand, is probably attended with less risk in South Africa than in California, owing to differences of climate.

Pettey (F. W.). **Codling-moth Control in Western Districts of the Cape Province.**—*Jl. Union S. Africa Dept. Agric.*, vii, no. 3, pp. 268–276. Pretoria, September 1923.

It is suggested that the chief reason for the lack of success in control of the codling moth [*Cydia pomonella*, L.] in the Cape Province is that sufficient care has not been exercised in the application of remedial measures. The essentials of successful control are discussed and are summarised from previous articles [R.A.E., A, vi, 324; x, 7, 550].

Faes (H.) & Staehelin (M.). **La destruction du ver blanc ou larve du hanneton** (*Melolontha vulgaris*).—*Ann. agric. Suisse*, xxiv, no. 2, pp. 101–105. Berne, 1923.

The larvae of *Melolontha melolontha* (*vulgaris*) are very resistant to contact insecticides and immersion in water, but may be destroyed by means of soil fumigants. As the gases used for this purpose are heavier than air, they should not be injected too deep into the soil.

Their efficacy is also reduced in very light soils, as they tend to sink too far before affecting the larva.

In laboratory experiments carbon bisulphide killed all larvae exposed for 24 hours to a concentration of about 1 oz. to 4 cu. yds., whereas greater concentrations for shorter periods were less effective. The action of hydrocyanic acid gas and chloropicrin is more rapid.

FAES (H.) & STAEHELIN (M.). **Un dangereux parasite de l'abricotier en Valais, la *Lyda nemoralis*.**—*Ann. agric. Suisse*, xxiv, no. 2, pp. 107–111, 2 figs. Berne, 1923.

The sawfly, *Neurotoma* (*Lyda*) *nemoralis*, is a serious pest of apricots in Valais, and was particularly injurious in 1923. Adults were seen in large numbers about 23rd April, but the first eggs had been observed as early as 9th April. They are laid on the lower surface of the leaves in groups of from 10 to 50. Incubation lasts 8–14 days. The larvae feed on the leaves. When full grown, they descend into the soil for hibernation, pupation occurring the following spring and lasting about a fortnight. Loose and frequently cultivated soil such as occurs in vineyards, where many apricot trees are planted, is particularly suitable for the hibernating larvae.

This sawfly is found all over Europe, and it attacks many other stone fruits. It may easily be controlled by the judicious application of remedial measures. Spraying with lead arsenate (1 to 2 per cent.) as soon as the first larvae appear is recommended. Attention is drawn to the precautions necessary in applying arsenicals.

Contact insecticides are less dangerous and should be applied as soon as all the larvae have emerged.

It is suggested that the local authorities should enforce the application of a contact insecticide in 1924. As a result of laboratory and field observations the formulae recommended are 2 per cent. soft soap with the addition of titrated nicotine or concentrated tobacco extract (1 per cent.) or as an alternative a solution of one part of pyrethrum soap to 10 of water.

MYERS (J. G.) & ATKINSON (E.). **The Relation of Birds to Agriculture in New Zealand. IV. The Insectivorous Small Birds.**—*N.Z. Jl. Agric.*, xxvii, no. 2, pp. 76–85, 3 figs. Wellington, 20th August 1923.

This paper deals with some dozen species of indigenous birds, which represent all that is beneficial in bird-life so far as insect control is concerned in New Zealand. They are specialised insect hunters and form one of the greatest factors in checking the damage caused by insect pests. Details are given of the local distribution and habits of the species concerned.

GREEN (E. E.). **Observations on British Coccidae.—viii.**—*Ent. Mo. Mag.*, lix, pp. 211–218, 4 figs. London, September 1923.

The Coccids dealt with include *Phenacoccus interruptus*, sp. n., on grass in Surrey, and *Pseudococcus wistariae*, sp. n., on *Wistaria* in Hertfordshire.

Hygiene and Disease in Eastern Tropical Africa. The Protection of Aircraft from the Attacks of Insects.—Crown 8vo, 58 pp., 21 figs., 1 map. London: H.M.S.O. [No. I.D. 1055A], 1923. Price 2s. net.

This little book was prepared on behalf of the Admiralty and the War Office. Part II is chiefly restricted to the tropical regions, but exceptions are noted where they occur. Notes are given on the insects liable to damage a finished aeroplane or stores of spare parts, *viz.*, wood-boring beetles and termites, the preparations recommended for protecting timber from the attacks of insects and fungi, and the utilisation of local timbers for the construction of sheds.

LESNE (P.). **Notes sur les Coléoptères Térédiles: 19. Diagnoses préliminaires de Bostrychides nouveaux de l'Afrique tropicale.**—*Bull. Mus. natnl. Hist. nat.*, no. 1, pp. 55–60. Paris, 1923.

The new species described include *Dinoderus oblongopunctatus* from dried sweet potatoes in French Guinea, and *D. porcellus* from dried sweet potatoes and *Raphia* in French Guinea, Sierra Leone and the Ivory Coast.

Le *Chrysomphalus minor* **(pou rouge).**—*Rev. agric. Afr. Nord*, xxi, no. 217, p. 619. Algiers, 28th September 1923.

Chrysomphalus dictyospermi pinnulifera (*minor*) was very abundant in Algeria during the summer of 1923, the warm, damp weather being very favourable to it. Oranges suffered particularly, losing many of the leaves. Insecticides, and particularly lime-sulphur, are very efficacious, but cannot be used after the fruits have formed; the spraying must be done after pruning, either in winter, after the crop is gathered, or in the spring (May–June).

THEOBALD (F. V.). **New Aphididae found in Egypt.**—*Bull. Soc. R. ent. Egypte*, xv (1922), pp. 39–80, 13 figs. Cairo, 1923.

The 14 new Aphids described in this paper were collcctcd in and near Cairo, records of other species, some of which are new to Egypt, being also included.

The new species are *Capitophorus cynariella* from globe artichoke (*Cynara scolymus*); *Hyalopterus obscurus* from fennel; *Aphis cistiella* from gum lac (*Butea frondosa*); *A. acori* from sedge (*Cyperus longus*); *Anuraphis foeniculus* from fennel; *A. cinerariae* from cinerarias; *A. cyani* from cornflower (*Centaurea cyanus*); *A. apiifolia* from celery (*Apium graveolens*); *Acaudus calami* from sedge (*Cyperus longus*); *Chaitophorus inconspicuus* from white poplar (*Populus alba*); *Tetraneura cynodontis* from Bermuda grass (*Cynodon dactylon*); *T. aegyptiaca* from *Panicum* sp.; *Geoica spatulata* from *Panicum* sp.; and *Asiphonella* (gen. n.) *dactylonii* from *Cynodon dactylon.*

BOUCLIER-MAURIN (H.). **La Cécidomyie destructive.**—*Rev. agric. Afr. Nord*, xxi, no. 218, pp. 639–641. Algiers, 5th October 1923.

Mayetiola (*Cecidomyia*) *destructor*, Say (Hessian fly) causes serious damage annually in the Mascara region of Algeria; it is particularly destructive during normal years when the plants appear vigorous, whereas in dry seasons its activities seem to be somewhat reduced. A brief account is given of its biology; although parasites are

undoubtedly present in this region, there has been no opportunity for their study. The usual remedial measures are outlined, those especially recommended being the burning of all stubble and rotation of crops.

Work of the Entomologist.—*Rept. Dept. Agric. Tanganyika Territory, 1922*, pp. 19–21. London, 1923.

Coconut pests included *Oryctes boas*, F., and *O. monoceros*, Ol., which should be materially checked by the coconut regulations of 1922; *Rhyncophorus phoenicis*, F., which was not considered serious; and the scale, *Aspidiotus lataniae*, Sign., which was almost confined to palms growing under unfavourable conditions. Sisal [*Agave sisalana*] was attacked by the weevil, *Scyphophorus acupunctatus*, Gyll., which seems to be confined to the coast, and breeds chiefly in poled sisal bases, so that it should be largely checked by proper cultivation. Coconut beetles were also breeding in decaying sisal bases, together with the predatory Histerids, *Hololepta scissoma*, Mars., *Hister geminus*, Er., and *Placodes ebeninus*, Lew. The Coccid, *Aspidiotus orientalis*, Newst., occurs on all kinds of *Agave* in the Territory, but is not as yet considered of economic importance.

Cotton pests included the weevil, *Apion xanthostylum*, Wagn., which attacks the stem collar, branch bases and boll bases, and is most injurious in conditions of early unfavourable weather and neglected cultivation. Preventive measures against it are planting a strong, early maturing variety of cotton, maintaining good cultivation, rotation with leguminous crops, cleaning of seed-cotton on the farm or plantation, and encouragement of an unidentified small black Chalcid, parasitic on the larvae. The outlook with regard to *Platyedra gossypiella*, Saund., is considered on the whole satisfactory; to prevent its increase, instruction should be given to cotton growers, early, robust types of cotton should be selected, cotton should not be grown in unsuitable areas, all crop residues in field, store and ginnery should be destroyed, and seed and field treatment should be attended to. A certain amount of parasitism has been observed by an unidentified Chalcid and Braconid. There was a sudden outbreak of both *Earias insulana*, Boisd., and *Heliothis* (*Chloridea*) *obsoleta*, F., in May and June, both almost disappearing in July; the former bred also on *Hibiscus* spp. and various wild Malvaceae, and the latter on maize, which matured just as the cotton was bolling. Outbreaks of *Sylepta derogata*, F. (cotton leaf-roller) coincided with these two pests. Stainers, *Dysdercus cardinalis*, Gerst., *D. fasciatus*, Sign., *D. nigrofasciatus*, St., and *Oxycarenus hyalinipennis*, Costa, were almost negligible. Enemies of cotton pests included the Vespid, *Icaria nobilis*, Gerst., predacious on the bollworms, and the Reduviids, *Phonoctonus principalis*, Gerst., and *P. nigrofasciatus*, St., on *Dysdercus*.

Other cotton pests recorded included *Alcides brevirostris*, Boh., *Tragicoschema nigroscriptum*, Fairm., *Phenacoccus obtusus*, Newst., and *Hemichionaspis minor*, Mask., infesting the stems; *Syagrus morio*, Har., *Nisotra weisei*, Jac., *Aphis gossypii*, Glov., and *Zonocerus elegans*, Thunb., on the leaves; *Popillia bipunctata*, F., *Mylabris amplectens*, Gerst., *M. hersteni*, Gerst., *M. dicincta*, Bertol., and *Nosognatha ruficollis*, Ol., on the blossoms; and the bugs, *Calidea* sp. and *Leptoglossus membranaceus*, F., on the bolls.

Other economic insects recorded were the weevils, *Alcides dentipes*, Oliv., girdling groundnuts, and *A arcuatus*, Boh., girdling cowpeas.

BUCKHURST (A. S.), STANILAND (L. N.) & WATSON (E. B.). **British Hymenoptera.**—Crown 4to, 48 pp., 8 plates, 16 figs. London: Edward Arnold & Co., 1923. Price 9s. net.

The aim of this small volume is to provide a guide, of a non-technical character, to the Hymenoptera, to which very little attention has been paid, the life-histories and habits of many species, in the parasitic groups in particular, being quite unknown. A short account is given of each family, sufficient for identification, and an outline classification of the order is included.

MALENOTTI (E.). **Brevi note sull'** ***Aphelinus mali*****, Hald.** [Brief Notes on *A. mali*.]—Reprint, 8 pp., 4 figs., from *L'Agric. Vicentina*, no. 9. Vicenza, 15th September 1923.

The Chalcid, *Aphelinus mali*, obtained from France and from Uruguay [*R.A.E.*, A, xi, 320] has now established itself in the neighbourhood of Vicenza, where it was distributed in order to check *Eriosoma* (*Schizoneura*) *lanigerum* infesting apple. *A. mali* also parasitises the pear aphis [*E. pyricola*], which is a new pest of pears in Italy. A short description of this Aphid and of its habits is given.

CRUZ LAPAZARÁN (J.). **La plaga de la langosta en la Región Aragonesa.** [The Locust Pest in Aragon.]—*Bol. Soc. ent. España*, vi, no. 5–6, pp. 78–82. Saragossa, May–June 1923.

With regard to the control of locusts in Aragon [*R.A.E.*, A, xi, 351], it is now definitely known that deep ploughing in September and October destroys 100 per cent. of the egg-cases. The value of harrowing increases in direct proportion to the earliness of the operation, and therefore in August it is more effective than in November and December. It injures the cases sufficiently to destroy the vitality of the eggs, assists the action of birds, and exposes the eggs to climatic action, heat in particular.

By the end of December 1922 all the correctly charted areas had been cleared, but elsewhere eggs appeared in abundance. Some of them were destroyed by parasites, especially the larvae of a Bombyliid fly, *Systoechus oreas*, larvae of a beetle, *Trichodes amnios*, being present in smaller numbers. Work in April included trenching, the use of flame-throwers, and spraying with insecticides, such as sodium arsenite. All these methods of control have contributed to check the outbreak, and if some further effort is made in the coming winter, it is expected that locusts will cease to be so serious a menace as they have been during the past ten years.

PAILLOT (A.) & FAURE (J. C.). **Sur le puceron vert du pêcher.**—*Progr. agric. & vitic.*, lxxx, no. 39, pp. 326–328. Montpellier, 30th September 1923.

This information concerning the recent outbreaks of the green peach aphis [*Myzus persicae*, Sulz.] in France has already been noticed [*R.A.E.*, A, xi, 455].

CORBETT (G. H.). **Food Plants of** ***Leptocorisa*** **spp. (Padi Fly, Rice Sapper, Pianggang).**—*Malayan Agric. Jl.*, xi, no. 7–9, pp. 213–215. Kuala-Lumpur, July–September 1923.

Leptocorisa varicornis, F., *L. acuta*, Thunb., or *L. costalis*, Herr. Sch. are generally recorded from Malaya as damaging the grains of rice

both in the nymphal and adult stages, and occasionally as occurring on grasses. Experiments show that one species, probably *L. costalis*, is capable of passing its whole life-cycle on the inflorescences of the following graminaceous plants: *Panicum colonum, Paspalum conjugatum, P. platycaula, Sorghum, Eleusine coracana, Pennisetum typhoideum* and *Panicum crus-galli*. Newly emerged nymphs died on *Eleusine aegyptiaca, E. indica, Panicum indicum, P. maximum, Eragrostis amabilis, Centotheca lappacea, Ischaemum ciliare, Fimbristylis* sp. and Cyperaceae.

Though it cannot be definitely stated what species of grasses are suitable for the development of *Leptocorisa* spp., observations show that certain ones around rice areas provide food for the nymphs and adults, maturity of the latter coinciding with the development of the rice grains. Self-sown rice and grasses springing up between the rice seasons should therefore be destroyed.

It is possible that the bearded varieties of rice with thick glumes and closely set spikelets are more resistant than other varieties to attacks by these pests.

TRYON (H.). **The Orange Tree Bug.**—*Queensland Agric. Jl.*, xx, pt. 2, p. 90. Brisbane, August 1923.

A peculiar phase in the life of the orange tree bug [*Oncoscelis sulciventris*] [*cf. R.A.E.*, A, xi, 278] occurs after casting the skin when the insect is about five days old. During this time the insect is almost as thin and flat as paper and the colour resembles the green of the lower surface of the leaves. Hibernation apparently occurs on the orange trees in this stage. If the tree is shaken, the insects fall to the ground, but immediately make for the trunk of the tree and crawl up the bark to their original place. Experiments are to be undertaken with a view to the possibility of control during this phase.

Reported Occurrence of Boll Weevil in the Northern Territory.—*Queensland Agric. Jl.*, xx, pt. 2, p. 101. Brisbane, August 1923.

A recent report of *Anthonomus grandis* (boll-weevil) from cotton fields in the Northern territory is erroneous and apparently referred to *Platyedra gossypiella* (pink bollworm). According to a report of H. Tryon, the latter definitely exists in the Northern Territory, in view of which he suggests the isolation of this region with respect to cotton from the remainder of Australia.

GROFF (C. G.). **Grasshopper Control in Alberta.**—*Agric. Gaz. Canada*, x, no. 5, pp. 436–440. Ottawa, September–October 1923.

Grasshopper infestation in Alberta, which has been assuming serious proportions in the last few years, became so widespread in 1922 that a combined effort was necessary to combat it, and legislation was passed compelling farmers to take action to destroy the hoppers. Bait-mixing stations were established in 215 places, and a large staff and enormous quantities of material were employed. The species most usually encountered was the roadside grasshopper [*Camnula pellucida*], eggs of which hatched about 26th May, the hoppers becoming winged about 28th June. The lesser migratory locust [*Melanoplus atlantis*] was also abundant in South Alberta, hatching about 20th May and flying about 26th June, and was frequently accompanied by the two-striped

grasshopper [*Melanoplus bivittatus*] and by *M. gladstonei*. The bait used in 1922 was composed of 50 lb. bran, 50 lb. sawdust, 5 lb. salt, 2 gals. molasses, 5 lb. arsenic and 10 gals. water. In 1923 it was found possible to reduce the molasses to 1 or ½ gal. and the salt and the arsenic to 4 lb. each. In some cases 3 oz. of amyl acetate were added after 15th June as an additional attractant. The bait was most effective when applied between 6.30 and 10 a.m., and the best method of application was to scatter it along the edges of the fields. For *M. atlantis*, the bait was best applied in strips from 2 to 5 rods apart throughout the fields. Abandoned farms constituted a difficult problem, particularly in the sandy areas of the south; it is recommended that the municipal authorities should have such farms burnt over during the last week in May In summer fallows, the strip method is recommended, the strips being poisoned before ploughing or disking is completed. This is both economical and more effective. For infested rye fields, autumn poisoning is recommended; spring poisoning should not begin until the last week in May, when all the eggs will have hatched. If part of an infested field is to be cut for hay, it is advisable to cut in strips of one or two binder widths from 5 to 70 rods apart. ' Within a few days the hoppers will gather along the edges of the cut strips and can then be economically poisoned.

SNAPP (O. I.) & ALDEN (C. H.). **Further Studies with Paradichlorobenzene for Peach Borer Control with special Reference to its Use on young Peach Trees.**—*U.S. Dept. Agric.*, Bull. 1169, 18 pp., 3 plates, 1 fig. Washington, D.C., 13th September 1923.

The use of paradichlorobenzene against *Aegeria exitiosa*, Say (peach tree borer) has become very general, 250,000 lb. of the chemical having been used during 1921 in Georgia alone, and it is expected that more will be required in 1922. During the autumn of 1921 and the spring of 1922, extensive experiments were carried out with this substance on trees of from 1 to 6 years old, details of which are given, though final recommendations cannot be made until further experimental work is completed.

The results of the experiments, however, suggest a dose of ¾ oz. for trees of 4 years and under, and 1 oz. for 5-year-old ones and over. Better results were obtained with autumn applications than with spring ones, the best time in Georgia being about 10th October In this State under normal autumn conditions it is not necessary to uncover the base of the older trees 4 to 6 weeks after treatment, though this precaution is advisable when the weather is abnormally cool, when late applications are made, or when young trees are treated.

Under laboratory conditions the gas was liberated at about the same rate in both sandy loam and clay soils, and killed all the larvae as far as 1 ft. below the soil level within three weeks. The action of the gas depends on the temperature and moisture of the soil, being retarded with low temperature and high moisture content.

SNAPP (O. I.). U.S. Bur. Ent. **Controlling the Peach Borer with Paradichlorobenzene.**—*Qtrly. Bull. State Plant Bd. Mississippi*, iii, no. 2, pp. 1–7, 7 figs. A. and M. College, Miss., July 1923.

The application of paradichlorobenzene for the control of the peach tree borer [*Aegeria exitiosa*, Say] is discussed with special reference to Mississippi conditions, the recommendations being very similar to those suggested in the preceding paper.

FLINT (W. P.) & HACKLEMAN (J. C.). **Corn Varieties for Chinch-Bug infested Areas.**—*Illinois Agric. Expt. Sta.*, Bull. 243, pp. 540-550, 5 figs. Urbana, Ill., April 1923. [Received 9th October 1923.]

Details are given of experiments that have been in progress during the past five years in Illinois with the object of determining the varieties of maize that are resistant to attacks of the second generation of the chinch-bug [*Blissus leucopterus*, Say].

Directions for Spraying Fruits in Illinois.

BURLISON (W. L.) & FLINT (W. P.). **Fight the Chinch Bug with Crops.**

FLINT (W. P.). **Chinch Bug Barriers.**—*Illinois Agric. Expt. Sta.*, Circ. 266, 16 pp., 2 figs.; Circ. 268, 15 pp., 7 figs.; Circ. 270, 8 pp., 3 figs. Urbana, Ill., April and May 1923. [Received 9th October 1923.]

These three circulars are all revisions of previous ones [*R.A.E.*, A, x, 206, 207; xi, 70].

WOGLUM (R. S.). **Fumigation of Citrus Trees for Control of Insect Pests.**—*U.S. Dept. Agric.*, Farmers' Bull. 1321, 58 pp., 33 figs. Washington, D.C., July 1923. [Received 9th October 1923.]

This paper supersedes a previous bulletin [*R.A.E.*, A, vi, 568] and contains all the latest information with regard to fumigation with hydrocyanic acid gas. Many details are given of improved apparatus and technique. The county regulations governing fumigators operating in Southern California, 1922–23, are appended.

HARTLEY (E. A.). **A useful Cage for the rearing of small Insects on growing Plants.**—*Ohio Jl. Sci.*, xxiii, no. 4, pp. 201–203. Columbus, Ohio, July–August 1923.

The cage described is made of a rectangular piece of sheet celluloid bent to form a cylinder, the edges being sealed with 95 per cent. alcohol. Ventilation holes of any size and position may be cut before the material is bent, and the openings covered with cheese cloth, which can be kept in place with shellac around the edges. Melted paraffin wax should be poured on the soil around the plant over which the cage is to be placed. This provides a smooth white surface at the bottom of the cage. If the edges of the cage are thinly coated with vaseline before placing it on the melted paraffin, they will not adhere, and on removing the cage a groove is left in the wax into which the cage may be easily replaced. These cages are more satisfactory than glass, as they can be made of any size and shape, and do not sweat or concentrate heat. The chief drawbacks of this type of cage are the cost of material and time for making. Although exposed to unfavourable conditions of heat and moisture, no deterioration of the material has been noticed.

CROUSE (F. L.). **La acción del *Aphelinus mali* en Chile.** [The Work of *A. mali* in Chile.]—*Uruguay: Minist. Indust., Defensa Agrícola, Bol. Mens.*, iv, no. 7–8, p. 79. Montevideo, July–August 1923.

Excellent results have been obtained in Chile with *Aphelinus mali*, Hald., imported from Uruguay [*R.A.E.*, A, xi, 320] against the woolly apple aphis [*Eriosoma lanigerum*].

TRUJILLO PELUFFO (A.). **El** *Chrysomphalus aonidum.*—*Uruguay: Minist. Indust., Defensa Agricola, Bol. Mens.*, iv, no. 7–8, pp. 80–82, 3 figs. Montevideo, July–August 1923.

In Uruguay *Lepidosaphes beckii*, Newm. (*Mytilaspis citricola*, Pack.) is the commonest pest of *Citrus*, but another scale, *Chrysomphalus aonidum*, L., has appeared and is rapidly increasing.

SARMIENTO (V. M.). **Insect Carriers of** *Diplodia* **in Storage-rots.**—*Philippine Agric.*, xii, no. 2, pp. 77–91. Los Baños, July 1923.

The fungus, *Diplodia*, is of widespread occurrence in the Philippines, where it attacks a number of plants in storage, including roots, seeds and fruits. It is said that the loss in sweet potatoes stored in the United States amounts to several million dollars annually. A study has therefore been made of the insects associated with products infected with *Diplodia*, with a view to determining their rôle as transmitting agents. Many insects, especially Coleoptera and Diptera, were found to carry spores. The most abundant on stored roots and fruits were *Araecerus fasciculatus*, DeG., *Cylas formicarius*, F., *Calandra oryzae*, L., *Colobicus parilis*, Pasc., *Carpophilus* spp., *Musca domestica*, L., and *Drosophila melanogaster*, Mg. (*ampelophila*, Lw.). These, together with *Prometopia quadrimaculata*, Mot., were all found capable of producing infection on sweet potato, yams, cassava and *Citrus*. They all proved to be carriers of spores that readily fell off with their movements, and when brought into contact with *Diplodia* spores they carried these, thus infecting the roots on which they fed and were breeding.

In order to exclude the insects the products should be put on the market immediately after the harvest, or kept in bins or barrels disinfected with 3 pints formaldehyde to 50 gals. of water. Against *C. oryzae*, sunlight is a good preventive, and fumigation with carbon bisulphide in air-tight boxes is also suggested. Injured tubers should be kept separate in storage, as bruises or wounds are the spots usually attacked by the insects carrying the disease. Diseased tubers should be burned or buried as soon as detected. Sweet potatoes should be stored in a moist place, yams, cassava and citrus in well ventilated places. Proper screening of storage places will exclude all the spore-carrying insects.

SPIECKERMANN (A.). *Aphodius fimetarius* **L. als Kartoffelschädling.** [*A. fimetarius* as a Potato Pest.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, iii, no. 9, p. 68. Berlin, 1st September 1923.

The common dung beetle, *Aphodius fimetarius*, L., which is not usually a pest of plants, is here recorded as causing the loss of part of a potato crop in the field owing to the larvae having destroyed the sets. The beetle was doubtless introduced in manure.

UTERMARK (W. L.). **De economische beteekenis van het geslacht** *Citrus*, **in het bijzonder voor de Nederlandsche Overzeesche Gewesten.** [The Economic Importance of the Genus *Citrus*, particularly for the Dutch Overseas Regions.]—*Koloniaal Inst. Amsterdam*, Meded. xix, Afd. Handelsmus., no. 4, 212 pp. Amsterdam, 1923. Price *Fl.* 3·90.

This publication contains a chapter of briefly compiled information on the pests of *Citrus* and their control.

THEOBALD (F. V.). **The Aphides attacking Cereals in Britain.**—*South Eastern Agric. Coll., Advisory & Res. Dept.*, Bull. 2, 18 pp., 8 figs. Wye, 1923. Price 1s.

An account is given of the six Aphids found on cereal crops in Britain, including their distribution, food-plants and seasonal occurrence. Of these, *Amphorophora triticum*, sp. n., is so far only recorded from Kent, where it is found on the blades of wheat. Of the other species, four were recorded from wheat, oats, barley and various grasses, *viz.*, *Macrosiphum granarium*, Kirby, occurring all over Great Britain, and its natural enemies including *Ephedrus* sp., *Adalia (Coccinella) bipunctata* and Syrphids; *Myzus festucae*, Theo., also found on *Festuca ovina, Dactylis glomerata* and *Bromus* sp.; *Siphonaphis (Aphis) padi*, L., also found on bird cherry (*Prunus padus*) and wild cherry (*P. cerasus*); and *A. avenae*, F. (which the author considers clearly distinct from *S. padi*), the last three occurring in England and Wales. *Toxoptera graminum*, Rond., was recorded from England and Scotland, on three occasions only, twice on grasses and once on wheat.

The distribution of *Macrosiphum granarium* includes also Europe, America and Japan, and that of *Toxoptera graminum*, Italy, Hungary, Belgium, Africa, Canada, United States and Mexico.

STANILAND (L. N.). **The Immunity of Apple Stocks from Attacks of Woolly Aphis** (*Eriosoma lanigera*, **Hausmann**). **Part I. The Relative Resistance of Different Root Stocks.**—*Jl. Pomology & Hortic. Sci.*, iii, no. 2, pp. 85–95. London, April 1923.

Owing to the difficulty of treating *Eriosoma lanigerum* (woolly apple aphis) with sprays or other remedies, it is essential for successful apple growing to use root stocks that show a high degree of resistance or complete immunity from this pest. A study of the results of infection of different types of apple stock have shown that complete immunity is very rare, and that a high degree of resistance of root and branch is also rare. None of the true types of so-called "Paradise" is immune, though there are very marked differences in degrees of resistance both above and below ground. The variety Northern Spy, under English conditions, is immune both root and branch; Winter Majetin, which has as yet only been tested for branch susceptibility, is immune also. The same degree of root and branch resistance, however, does not always go together. The degree of resistance to attack is about equal above and below ground in eight cases. In six cases the resistance is greater below ground than above, and in two cases *vice versa*.

A stem immune plant, in the case of Majetin, has been found to retain its immunity, though worked on a susceptible root. How far this may be of general application is still being tested. There seems to be no obvious connection between either vigour and dwarfingness, or fibrous roots and coarse roots, and susceptibility and immunity to *E. lanigerum*. Above ground, wound tissue, young wood and water shoots are most easily attacked. Such points as these have not been decided with regard to the roots. Further investigations are still being pursued; in particular, a search among existing immune plants for individuals that might combine the other desirable characteristics that have been found among the known apple stocks, and the systematic breeding of new plants combining those characters with immunity.

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Lees (A. H.). **A Note on the Effect of Sulphur on Black Currant Mite.**—*Jl. Pomology & Hortic. Sci.*, iii, no. 2, pp. 103–105. London, April 1923.

Lime-sulphur treatment for big bud [*R.A.E.*, A, viii, 350] caused by the black currant mite [*Eriophyes ribis*] has given such variable results, that further investigation has been made regarding the action of sulphur on migrating mites. As lime-sulphur, when sprayed on a plant, deposits a coat of sulphur while giving off sulphuretted hydrogen, any continued toxicity of the spray is likely to depend on the action of the sulphur itself. A number of experiments are described in which black currant twigs with big buds on them were fumigated under bell-jars with pure sulphur and with lime-sulphur, or dusted with a sulphur cloud. During these experiments, migration of the mites to healthy twigs placed under the bell-jars continued for about three weeks, during which time all the sulphur treatments exercised general control. The influence of the lime-sulphur treatment seemed to be weak after the first fortnight. Sulphur showed a highly toxic action, but its effectiveness is of short duration. In nature, migration of the mites may proceed for 2½ to 3 months, so that a second or third application would probably be necessary. If lime-sulphur is used, these later applications must be at summer strength, as the foliage will have reached a fairly advanced stage, and consequently far less sulphur is deposited at the second or third spraying. Dusting with a very fine sulphur powder or a sulphur cloud would seem to be the best method, but care must be taken to avoid scorching or leaving a sulphur deposit on the developing berries. At present there is no machine capable of producing the requisite cloud under open-air and commercial conditions; an attempt is being made to devise a suitable apparatus.

Green (E. E.). **A Brief Review of the Indigenous Coccidae of the British Islands.**—*Proc. S. London Ent. & Nat. Hist. Soc., 1922–23*, pp. 12–25, 4 plates. London, 1923.

A brief account is given of those species of British Coccids that are known to occur in the open.

Adkin (R.). **The Lepidopterous Enemies of Man, with special reference to Species that occur in Britain.**—*Proc. S. London Ent. & Nat. Hist. Soc., 1922–23*, pp. 26–47. London, 1923.

An account is given of the Lepidopterous pests that occur in Britain and the damage they cause to crops, stored food, clothing, etc.

Miles (H. W.). **The Apple Blossom Weevil: its Life-history and Control.**—*Ann. Rept. Agric. & Hortic. Sta., 1922*, pp. 49–52. Bristol, 1923.

The more important points in the life-history of the apple blossom weevil [*Anthonomus pomorum*, L.] and the suggested methods for its control are pointed out. These have been dealt with at greater length elsewhere [*R.A.E.*, A, x, 607].

Lees (A. H.). **Egg-killing Washes.**—*Ann. Rept. Agric. & Hortic. Sta., 1922*, pp. 58–61. Bristol, 1923.

Though the experiments described were of too short a duration to be absolutely conclusive, the results are very promising and indicate that both lime-sulphur and the two proprietary fluids tested have a

decided toxic action on the eggs of *Aphis pomi*. In the case of lime-sulphur the time of application and differences in strength between 1 : 10 and 1 : 20 did not appear to influence its effect on the eggs to any great extent, though slightly better results were obtained in March. A mixture of caustic soda and nicotine should also give good results.

PEREN (G. S.). **Spraying for the Control of the Logan Beetle.**—*Ann. Rept. Agric. & Hortic. Sta., 1922,* pp. 62–66. Bristol, 1923.

The experiments of 1920 and 1921 [*R.A.E.*, A, x, 464] against the loganberry beetle [*Byturus tomentosus*, F.] have been continued. The results indicate that lead arsenate is quite reasonably effective in controlling the beetle, thus strengthening the hope that after three years efficient spraying it will be possible to dispense with this treatment for one or two years, provided that there is no neighbouring source of reinfestation. The commercial application of the treatment appears to be justifiable, especially if a deterrent to bees can be found that will mix with the lead arsenate.

BALLARD (E.) & PEREN (G. S.). **Red Plant in Strawberries and its Correlation with "Cauliflower Disease."**—Reprint, 6 pp., from *Jl. Pomology & Hortic. Sci.* London [1923].

It has been noticed in examining a large number of strawberry plants that there is a constant overlapping of the symptoms of "red plant" and "cauliflower" disease. The diagnostic characters of each disease and their correlation with each other are discussed. A consideration of these has led to the belief that the two diseases are the same. Both are caused by *Aphelenchus fragariae*, R.-B., and the different symptoms are probably different responses to attacks of the same pathogenic organism. The factors governing these responses, the life-history of the Nematodes, and the methods of infection all remain to be studied.

DIFFLOTH (P.). **Les Parasites de la Betterave à Sucre. Le Nématode.** —*La Vie Agric. & Rur.*, xxiii, no. 40, pp. 253–256, 6 figs. Paris, 6th October 1923.

The Nematode, *Heterodera schachtii*, causes serious losses each year to the sugar-beet industry in France, and is very difficult to control. Its life-history and habits are described. Infestation in a field is recognisable by bare patches where no beets, or very few, undeveloped ones, are growing. Such patches generally appear only after infestation has been established for several years. The methods of dispersion of the Nematode are discussed; the commonest seems to be the removal and dispersal of the soil from around the beets when they are cleaned. Any campaign against the Nematode must be undertaken co-operatively; manufacturers should refuse to accept contracts for beets from infested land; those from infested fields should be dealt with separately; and the practice of throwing the soil along the public highways should be prohibited. When part only of a field is infested from year to year, that particular spot should be sown with some other crop and well cultivated. In lightly infested fields, planting should be delayed until it is certain that germination and growth will be rapid, and this should be accelerated by every means, such as manuring with sodium nitrate, constant watering, etc. Rotation of

crops is the best remedy for infestation with *H. schachtii*. Leguminous crops, such as peas, beans, lucerne or clover, can all safely be planted in infested land, and also wheat, oats, barley, maize and potatoes. Forage beets, all kinds of cabbages, turnips and radishes are alternative food-plants and should be avoided. Attention must also be paid to weeds that harbour the pest, such as field mustard (*Sinapis arvensis*) and all Salsolaceae. These rotations must be practised for at least 12 to 15 years, as Nematodes have been found still active after 9 years growing of lucerne.

O. P. **Insectes qui rongent les feuilles des céréales.**—*La Terre Vaudoise*, xv, no. 29, pp. 412–413. Lausanne, 21st July 1923.

Lema melanopa and *Anisoplia tritici* are recorded as unusually destructive to cereals in Switzerland, a brief account being given of their habits.

Wardle (R. A.) & Buckle (P.). **The Principles of Insect Control.**—8vo, xvi + 295 pp., 33 figs. Manchester, The University Press; London, New York, &c., Longmans, Green & Co., 1923. Price 20*s*. net.

The primary aim of manuals of economic entomology in the past has been the descriptions of the insects themselves, but this volume presents a digest of the vast literature of the whole field of insect control arranged in four parts: biological control, chemical control, mechanical control, and legislative control. Part I reviews the knowledge of host-resistance, climatic restraints, the diseases of insects, parasites and predators, and bird encouragement, in five chapters. Three chapters in Part II are devoted to insecticides, and the authors remark that: "The recognition and employment of chemicals in the control of insect pests have been from the first concomitants of accidental discovery and empirical application rather than the outcome of a train of scientific observations and logical deductions therefrom, and the introduction of fresh insecticidal substances has coincided nearly always with some sporadic outbreak of insect injury." Three further chapters discuss dips and dressings, attractants and repellents, and fumigants.

In the opening chapter of Part III—Mechanical Control—it is pointed out that the importance of proper cultural methods (especially the method of harvesting) in the control of insect pests has never been adequately realised; and in this connection the necessity for the co-operation of agriculturists over wide areas is emphasised. The next three chapters treat of the restriction of spread, crop storage, and baits and traps, respectively. The single chapter forming Part IV discusses legislative control in its several aspects; its true value is that it is the co-ordinating agent in any large scheme of insect control measures amongst agriculturists, and it is not in itself a method of control; but such legislation is often put into operation too late to give it a fair chance of proving effective.

An appendix on spraying and dusting machinery concludes with a brief discussion of the relative merits of each of these control measures. Twenty-six pages are devoted to the bibliography arranged under the chapter headings, and an adequate index complete this useful compendium of a subject involving ramifications into many, more or less disconnected, branches of natural science.

MENZEL (R.). *Tephrosia* **en wortelaaltjes.** [*Tephrosia* and Nematodes.]—*De Thee*, iii, no. 4, p. 129, 1 plate. Buitenzorg, December 1922. [Received 12th October 1923.]

Some young plants of *Tephrosia* have been found to be infested with *Heterodera radicicola*; attention is called to this fact, as this Nematode is injurious to tea, especially young plants.

MENZEL (R.). **Over het schadelijk optreden van een spanrups** (*Boarmia bhurmitra*, **Wlk.**) **in de thee.** [The injurious Occurrence of a Geometrid Caterpillar, *B. bhurmitra*, on Tea.]—*De Thee*, iii, no. 4, pp. 130–131, 2 plates. Buitenzorg, December 1922. [Received 12th October 1923.]

The Geometrid, *Boarmia bhurmitra*, Wlk., has been reported as injuring tea in Ceylon, and has now been found to do so in Java. A series of severe attacks took place at intervals of a few weeks. Similar outbreaks are recorded by Roepke in the case of *B. crepuscularia* on cinchona. The eggs are laid in small cracks of the bark, etc. The larvae feed on the leaves, or even on the bark of young twigs if leaves are scarce. The pupae are to be found at a slight depth in the ground quite close to the stems. The adults settle by day on the twigs and stems and are easy to catch. Remedial measures consist in collecting the larvae, pupae and adults.

LEEFMANS (S.). *Helopeltis* **in een djatibosch** [Teak Forest].—*De Thee*, iv, no. 1, p. 21. Buitenzorg, March 1923. [Received 12th October 1923.]

A larva of *Helopeltis antonii*, Sign., was taken in a teak forest from *Dioscorea oppositifolia*, a weed not hitherto recognised as a food-plant of this Capsid. No cacao or tea was growing in the vicinity, and this confirms the author's view that this bug has a great variety of food-plants and may be present before the introduction of cultivated crops.

ROSBERGER (J. C. A.). **Bestrijding van Hileud Badjera** (*Setora nitens*). [Measures against *S. nitens*.]—*De Thee*, iv, no. 2, pp. 47–48, 1 plate. Buitenzorg, June 1923. [Received 12th October 1923.]

The chief measure to be taken against *Setora nitens* infesting tea consists in collecting the cocoons and storing them in such a manner as to permit the escape of parasites.

MENZEL (R.). **Kina-insecten en hun parasieten.** [Insect Pests of Cinchona and their Parasites.]—*De Thee*, iv, no. 2, pp. 48–56. Buitenzorg, June 1923. [Received 12th October 1923.]

Some insect pests of cinchona also attack tea, and both plants are often grown on the same estates.

Observations on some Lepidopterous pests on cinchona were made early in 1923 on the Government plantations at Tjiñjiroean. They include *Metanastria hyrtaca*, which is heavily parasitised by Tachinids, *Odonestis plagifera*, *Daphnis hypothous*, *Euproctis flexuosa* and *Cricula* sp. Until recently few natural enemies of *Attacus atlas* were known, but the cocoons are sometimes parasitised, and parasites have been bred at the Tea Experiment Station from the cocoons of *A. ricini*, a smaller species. The eggs of *A. atlas* are attacked by a Chalcid, and in one case at least 80 per cent. of the eggs were parasitised.

An outbreak of a Hispid beetle, *Dactylispa* sp., occurred on cinchona on the east coast of Sumatra. The adults feed on the upper leaf-surface without perforating the leaf, and the larvae mine the epidermis. No remedies are known, but the collection and burning of leaves infested with the larvae may have some result. A Eumolpid, *Colasposoma* sp., feeds on the lower surface of the leaves. During a journey in southern Sumatra Dr. Bernard found a Coccinellid, probably *Epilachna indica*, that occurred on weeds and had migrated to cinchona. It is known that both adults and larvae of this beetle are phytophagous and feed especially on Solanaceae.

GARRETSEN (A. J.). **Het optreden van** *Eriboea* **in** *Albizzia*. [The Occurrence of *Eriboea* on *Albizzia*.]—*De Thee*, iv, no. 2, pp. 56–57, 2 plates. Buitenzorg, June 1923. [Received 12th October 1923.]

An instance of almost entire defoliation of an *Albizzia* tree by the caterpillars of a Nymphalid butterfly, *Eriboea* sp., is recorded.

GARRETSEN (A. J.). **Groenbemesters en** *Helopeltis*. [Green Manure Plants and *Helopeltis*.]—*De Thee*, iv, no. 2, pp. 57–58. Buitenzorg, June 1923. [Received 12th October 1923.]

As the planting of Leguminosae as green manure plants is necessary on tea estates, it is urged that shrubby species should be used and planted in the form of hedges along the tea plants. When the latter are pruned, the manure plants should be left unpruned for some time. In case of infestation by *Helopeltis*, tea growing beneath the Leguminosae will be protected.

KALSHOVEN (L.). **Aantasting van triplex-kistenhout door drooghoutboeboek (Lyctidae).** [The Attack of Tea-chest Three-ply Wood by Dry-timber Beetles.]—*De Thee*, iv, no. 2, pp. 59–65, 1 plate. Buitenzorg, June 1923. [Received 12th October 1923.]

In view especially of the Australian regulations guarding against the introduction of wood-boring pests, importance attaches to the discovery of a Lyctid beetle, *Lyctus* sp., attacking tea-chest three-ply boards in store at Buitenzorg. One outer layer, of a light-coloured wood, was reduced almost entirely to powder. The middle layer and the other outer one—both of a darker wood—were nearly intact. The same beetle was found in a board of forest timber, and another Lyctid, *Minthea* sp., was observed destroying the cleats (*i.e.*, not the panels) of a chest already put together.

Lyctid beetles do not infest wood in standing or freshly felled trees, but sawn timber and furniture are liable to infestation, and the spread of the beetle is therefore easily effected. The eggs are laid on the rough surface of the wood, so that oviposition leaves no visible injury. On hatching the larvae at once penetrate into the wood. Pupation takes place just beneath the surface, and the adults gnaw their way out through holes about $\frac{1}{25}$ in. in diameter. In the case of the species of *Lyctus* mentioned above, the life-cycle from egg to adult required 3–5 months or more, so that the result of oviposition at the sawmill may not be noticed until the timber has been sold. In general, only light, soft, whitish woods are attacked. Such timbers as form heartwood are attacked only in the sap-wood. Among the timbers susceptible to infestation in Java are *Odina wodier, Tetrameles nudiflora, Sterculia campanulata, Turpinia pomifera* and *Alstonia campanulata.*

Others that have been recorded as being infested are *Albizzia stipulata*, *Bombax malabaricum*, *Sterculia foetida*, *Mangifera indica*, *Garuga pinnata* and bamboo.

If the infestation is far advanced, the wood should be burned. Otherwise the pests may be killed by steeping it in water or by heating with dry heat or steam. Preventive measures include storage in well-lighted stores, where inspection is easy, the removal of all debris, especially parts of sap-wood, and careful seasoning of susceptible woods and their protection by the application of two coats of linseed oil or creosote diluted with paraffin. For tea chests such a protective wash must not be either poisonous or odorous.

De Jong (A. W. K.). **Verslag** [Report] **van den Directeur 1 Juli 1922 - 30 Juni 1923.**—*Meded. Algem. Proefst. A.V.R.O.S.*, Algem. Ser. no. 16, 24 pp. Medan, 1923.

On an oil-palm estate covered with *Mimosa*, yearling palms were badly injured by locusts, some being killed. Planting at an unfavourable date is believed to be the reason, as the leaves of the *Mimosa* were old when the palms were planted out.

On tea an outbreak of caterpillars of *Stauropus alternus* was suppressed by timely, energetic measures. Incipient infestation by *Helopeltis*, believed to have come from the woods, was checked by collection.

The red coffee borer, *Zeuzera coffeae*, was observed. The coffee twig-borer, *Xyleborus coffeae*, was kept down by Hymenopterous parasites.

On one estate coconuts were badly injured by the caterpillars of *Brachartona catoxantha*. All infested leaves were cut off and burned.

Sundararaman (S.). **Fungus on Caterpillars damaging Indigo Plants in the Rubber Station, Mooply.**—*Planters' Chronicle*, xviii, no. 39, p. 586. Coimbatore, 29th September 1923.

Indigo plants have been found bearing caterpillars that were dead and covered with a white fungus mycelium. Several caterpillars taken from ragi plants [*Eleusine coracana*] and dusted with the spores of this fungus died within five days, while those kept under similar conditions and not inoculated remained healthy.

Fardunji Dastur (J.). **The Mosaic Disease of Sugarcane in India.**—*Agric. Jl. India*, xviii, pt. 5, pp. 505–509, 2 figs. Calcutta, September 1923.

A short account is given of the occurrence of mosaic disease of sugar-cane in 1921 in Pusa. Transmission experiments with adults and nymphs of *Pyrilla* spp. and *Phenice moesta* had negative results.

Sen (P. C.). **Rice Hispa.**—*Bengal Agric. Jl.*, i, no. 1, pp. 13–15, 1 plate. Dacca, March 1921. [Received 17th October 1923.]

The rice Hispid [*Hispa armigera*] does considerable damage to rice leaves, particularly to rice standing in water. The eggs are laid singly inside the leaf and hatch in 3 or 4 days, the young larvae feeding within the leaf and causing yellow, withered spots. After about a week, pupation occurs inside the leaf, and lasts for 3 or 4 days, the adult living for 15 or 16 days and feeding on the epidermis of the

leaves. Young plants with soft leaves are particularly attacked, and preference is shown for soft varieties. When the pest occurs on dry rice fields, bagging is the only remedy, the insects so collected being dropped into water containing kerosene. The operation is most successful in the early morning, when the beetles do not fly readily. When they appear in large numbers, cutting off the tips of the plants reduces them considerably, but this must be done before the flowering shoot appears.

SEN (P. C.). **The Mango Weevil.**—*Bengal Agric. Jl.*, iii, no. 2, pp. 66–67, 1 plate. Dacca, June 1923. [Received 17th October 1923.]

Cryptorrhynchus gravis, F. (mango weevil) does much damage to mango fruits in eastern and northern Bengal, very often attacking the same tree year after year. The eggs are laid on the surface of the fruit when about half-grown (*i.e.* in late March or early April) and generally after a few showers, and oviposition continues for about a month. The larva bores into the fruit and eats its way through the pulp, becoming full-grown in about a month. Pupation occurs within the fruit. The immature stages occupy about 1½ months, but there is only one generation in a year. After the mango season, and during the rains, the weevils hide in the bark of mango trees or in empty holes left by borers or in the roots of epiphytes growing on the trees, remaining there until the next mango season. When the weevils are once established in a garden, it is very difficult to eradicate them. Clean cultivation is essential, and the areas round the trees should be hoed up or the whole area ploughed once in October, after the rains and before the blossoming period. Covering the fruits with small cloth bags in the last days of March will prevent oviposition, but this is only possible on a small scale. Destruction or early plucking of infested fruits has prevented damage to the next crop. During April the mangos should be examined at least twice a week, and during May, if infestation is suspected, a number of green fruits should be cut open. The fruit from infested trees should be buried deeply, or should be used before it is ripe, care being taken to kill the weevils inside.

DURUZ (W. P.). **Further Experiments in controlling the Peach Twig-borer.**—*The Fruitman*, iii, no. 7, p. 13, 1 fig. Fresno, Cal., July 1923.

The results of recent experiments against the peach twig-borer, *Anarsia lineatella*, Zeller, have confirmed the efficacy of the sprays previously recommended [*R.A.E.*, A, xi, 284].

DUDLEY (J. E.), U.S. Bur. Ent., WILSON (H. F.) & MECUM (W. D.). **Nicotine Dust kills Cucumber Beetles.**—*Wisconsin Agric. Expt. Sta.*, Bull. 355, 10 pp., 4 figs. Madison, Wis., June 1923.

The striped cucumber beetle [*Diabrotica vittata*, F.] is said to cause damage amounting to about £600,000 to £1,000,000 annually to cucurbit crops (cucumber, melon, squash) in the United States. In addition to the direct damage caused, the beetle transmits bacterial wilt and mosaic diseases. The most effective remedy is nicotine dust, which kills the beetles. Dusts containing copper sulphate or gypsum with a lime carrier retain their strength and are effective under all conditions. A 10 per cent. nicotine sulphate would be preferable, but as this is

unobtainable, 5 per cent. strength is used. A dust with 8 per cent. nicotine sulphate and 25 per cent. copper sulphate is believed to be the most stable and therefore the most reliable mixture, but this does not seem to be obtainable commercially. Nicotine dusts with active carriers, such as hydrated lime and unslaked lime, lose strength rapidly and are only effective under the most favourable conditions. Dusting should be done as soon as the plants appear and beetles begin to attack them, and all growers should work co-operatively, as the beetles can fly for two miles. A 10-days' period of co-operative dusting ought to be sufficient. The most suitable types of hand-duster to use for the purpose are described and figured. For small plants, 14 lb. of dust to the acre is sufficient. Dusting will be most successful in windless weather at a temperature of 65° F. or more.

WOLCOTT (G. N.). **The Distribution of the Pink Bollworm in Porto Rico.** —*Porto Rico Insular Expt. Sta.*, Circ. 85, 7 pp., 1 fig. San Juan, P.R., September 1923.

A further survey [*R.A.E.*, A, x, 535] has been made of the distribution of *Platyedra* (*Pectinophora*) *gossypiella* (pink bollworm) in Porto Rico, and the results are shown on a map. The normal dispersion by flight of the moths was found to be greater in extent from cotton fields than from scattered wild plants. It is to some extent aided by winds, and is almost, if not entirely, prevented by arid or semi-arid conditions.

[**Entomological Notes.**]—*U.S. Dept. Agric. Yearbook, 1922*, 1137 pp., 64 figs. Washington, D.C., 1923.

Various notes on agricultural pests are scattered throughout this volume. The cotton boll-weevil [*Anthonomus grandis*, Boh.] is now found in all the cotton-growing States. Calcium arsenate dust properly applied is very beneficial. It has not been possible as yet, however, to reduce the cost of this treatment to a point where it will be profitable on land producing less than half a bale of cotton to the acre. It is hoped that aeroplanes may prove to be of practical use in distributing this poison. The depredations of the pink bollworm [*Platyedra gossypiella*, Saund.] have been largely checked as the result of a thorough campaign, and only in three districts in proximity to Mexico have there been recurrences of infestation in Texas since the campaign of 1921. Careful inspection at places of entry has resulted in the interception of dangerous consignments harbouring this pest. The Japanese beetle [*Popillia japonica*, Newm.] is extending at the rate of about five miles annually, in spite of strict quarantine measures. Attempts are being made to colonise large numbers of parasites of this beetle. The situation with regard to the European corn borer [*Pyrausta nubilalis*, Hb.] remains unchanged. Vigorous campaigns and quarantine measures are necessary, and much is hoped from parasites introduced from the south of France.

Very far-reaching projects are being undertaken with a view to controlling forest insects. The extent of present and recent infestations of the commoner pests are indicated in maps.

The principal rice pests are *Lissorhoptrus simplex*, Say (rice water weevil), the immature stages of which feed on the roots; a Pentatomid bug, *Solubea* (*Oebalus*) *pugnax*, F., which sucks the juice from the

growing kernels; *Chilo plejadellus*, Zinck. (rice stalk borer), the larvae of which tunnel and kill the stems; and *Laphygma frugiperda*, S. & A. (southern grass worm), which eats the leaves.

PETTIT (R. H.). **A Repellent for Borers.**—*Canad. Hortic.*, xlvi, no. 10, p. 232. Peterboro, Ont., October 1923.

A mixture that has proved very successful in repelling flat-headed [Buprestid] borers from apple and other trees is described. A solution of 50 lb. potash soap softened for a few days (over steam-pipes) in 3 gals. water is heated in a double boiler to 180° F. Then 2 lb. flour and 25 lb. flake naphthaline are stirred in and the mixture is again heated to 180° F., and allowed to cool while being stirred occasionally. This can be made during the winter and stored in airtight drums. It is applied with a brush after warming and thinning slightly to the consistency of heavy cream. Applications have been tried every three weeks, beginning on 1st June. No injury to the trees has resulted, and they have been free from flat-headed borers, though untreated trees in the same orchards have been heavily attacked. The interval between the treatments could probably be extended.

DOANE (R. W.). *Leperisinus californicus*, **Sw., killing Ash Trees.**—*Canad. Ent.*, lv, no. 9, p. 217. Orillia, Ont., September 1923.

Though beetles of the genus *Leperisinus* are not as a rule considered of primary importance, *L. californicus*, Sw., is certainly responsible for severe injury to ash trees in the grounds of the University of California. The adult beetles enter at the base of a twig or through a rough place on the bud and then bore into the cambium, often entirely girdling the branch or twig. The eggs are laid in niches on each side of the burrow, and the larvae follow the grain of the wood, working in the cambium and scoring both the bark and the wood.

MARCOVITCH (S.). **A Root Weevil** (*Stephanocleonus plumbeus*, **Lec.**) **reared from Strawberry.**—*Canad. Ent.*, lv, no. 9, p. 218. Orillia, Ont., September 1923.

Stephanocleonus plumbeus, Lec., is recorded from Tennessee, where some of the larvae were found boring into the crown of strawberries. They evidently feed on the roots also, but do not appear to cause any serious injury. Pupae were found on 13th July, and the adults on 25th July. The winter is probably spent as a larva in the soil.

This weevil has hitherto been known from New Hampshire, Connecticut, Colorado and New Mexico, but no food-plant has apparently been recorded previously. The larva and the adult are described.

BURGESS (A. F.). **Controlling the Gipsy Moth and the Brown-tail Moth.**—*U.S. Dept. Agric.*, Farmers' Bull. 1335, 27 pp., 15 figs. Washington, D.C., July 1923.

This is a revision of a former bulletin, which it supersedes [*R.A.E.*, A, vi, 215], the actual information having been noticed from another source [*R.A.E.*, A, ii, 294]. The data concerning the present distribution of *Porthetria dispar*, L., and *Nygmia phaeorrhoea*, Don. (*Euproctis chrysorrhoea*, L.), the effect of climatic conditions on *P. dispar*, and the special gipsy-moth tree-banding material have also been noticed from various sources in this *Review*.

TOWER (W. V.). **The Cigar Beetle.**—*Porto Rico Agric. Expt. Sta. Mayaguez,* Agric. Extens. Notes no. 60, 1 p. [mimeograph]. San Juan, P.R., 15th September 1923.

The cigar beetle [*Lasioderma serricorne,* F.] is particularly injurious to cigars in Porto Rico, and also attacks the loose leaf tobacco and tobacco in the bales. The advantages of fumigation against this pest are pointed out.

ZOLOTAREWSKY (B.). **Chrysalidation de l'Eudémis dans la terre.**—*Progr. agric. & vitic.,* lxxx, no. 41, pp. 371–372. Montpellier, 14th October 1923.

The pupation of the vine moth [*Polychrosis botrana*] in the ground has generally been considered merely accidental, but observations in the southern vine-growing districts of France have revealed the presence of many pupae in the earth about the base of vine stocks. The majority of the first generation larvae pupate in the folds of leaves or between the berries of a cluster, in galleries of silken threads. Second generation larvae also pupate for preference in dried leaves, under the straw bands attaching the shoots to the supports, and occasionally in dried berries. In old vines with very little bark remaining, however, it was noticed that the number of pupae found did not by any means correspond with the number of larvae that had infested the vines, and a study of the earth around the base of the stocks showed many large clods, riddled with galleries made by earth-worms, and in these galleries were the pupae of *P. botrana.* The fate of these pupae when hibernating in the ground requires investigation, for their numbers are quite sufficient to infest a vine in the following season, even when the usual winter treatments have been given. It has previously been demonstrated that the moths cannot emerge from a depth of 2 in. of soil or a little over 3 in. of sand. Even at $1\frac{1}{8}$ in. emergence is only partial.

VINCENS (F.). **Sur l'Aspergillomycose des abeilles.**—*C.R. hebdom. Acad. Sci.,* clxxvii, no. 12, pp. 540–541. Paris, 1923.

The presence of a species of *Aspergillus,* causing a curious mycosis of bees, has been known for some years in central Europe only, but the fungus has recently appeared in larvae and nymphs in a colony of bees from the Maritime Alps. Infection of adult bees has been obtained by feeding them on honey containing spores of *Aspergillus* in suspension. The virulence of the fungus seems to depend upon the morphological variety from which the spores are taken, the temperature at which the infected bees are maintained, and, in a large measure, on the concentration of the syrup on which they have been fed. The parasite seems to act by mechanically obstructing the digestive tract or by paralysis of the intestinal muscles. It is not likely that the disease will spread to any great extent in France, where it can easily be avoided by simple hygienic methods. It seems, however, possible that the fungus, which is common in France, may have some connection with the diseases of which the causes are unknown but which appear every spring among bees, and which are undoubtedly similar to the infection experimentally reproduced during this investigation.

VINCENS (F.). **Sur une muscardine à** *Beauveria bassiana* **(Bals.) Vuil. produite expérimentalement sur des abeilles.**—*C. R. hebdom. Acad. Sci.*, clxxvii, no. 16, pp. 713–715. Paris, 1923.

The resemblance in the appearance of the larvae and pupae of bees attacked by *Aspergillus* and those of other insects killed by the disease known as muscardine led the author to experiment as to the effect of *Botrytis bassiana* on bees. It was found that by the end of the sixth day all the bees fed on honey infected with this fungus were dead. It is therefore urged that the ease with which bees are infected with a fungus absorbed with food should be considered when dealing with the question of the control of insect pests by means of fungi.

Conférence internationale de lutte contre la mouche de l'olive. Actes de la Conférence internationale, Madrid 18-21 Juin 1923.—162 pp., 3 plates. Madrid, 1923.

Among the resolutions passed at this international conference on *Dacus oleae* were the following: Compulsory associations should be formed among olive growers to combat the fly; further work should be done in artificial control, especially with sprays and poison-baits; all information should be forwarded to the International Institute of Agriculture, Rome, each year early in October; the biology of *Dacus oleae* and its parasites should be studied in the various countries affected; an effort should be made to acclimatise in Europe the parasite, *Opius concolor*, now known to occur in North Africa; attempts should be made to introduce into Europe the parasites existing in South Africa (where the climate is similar to that of south Europe); a permanent international technical committee should meet at least once a year at Rome to discuss questions concerning the olive fly; the various governments are advised to create a fund, of which the proceeds should be chiefly expended in combating this pest; bird protection should be promoted.

BARBEY (A.). **La Forêt européenne et sa résistance aux attaques des Insectes ravageurs.**—*Rev. Bot. appl. & Agric. colon.*, iii, Bull. 25, pp. 593–604. Paris, 30th September 1923.

The chief groups of insects attacking various kinds of trees in the forests of Europe, and the damage they do, are briefly reviewed. Insects are undoubtedly the most serious enemies of these forests, uniform stands of resinous varieties and pure stands being the most susceptible. At the time of regeneration of these stands, deciduous trees should be combined with conifers, and, where the soil is suitable, preference should be given to beeches, in order to permit of a long regeneration period. When fresh afforestation is being planned, the production of resinous wood should be considered, but leafy and coniferous trees should be closely intermixed. Insectivorous birds, especially woodpeckers, should be protected; these birds not only destroy the insects, but also serve to indicate those trees that are infested. Questions of biology and parasitism should be studied in connection with afforestation, and forest entomological stations, on the lines adopted in the United States, should be organised.

PAILLOT (A.). **Sur une nouvelle flagellose d'Insecte et un processus d'infestation naturelle non encore décrit.**—*C.R. hebdom. Acad. Sci.*, clxxvii, no. 8, pp. 463–465, 2 figs. Paris, 1923.

Herpetomonas (*Leptomonas*) *chatoni*, sp. n., has been found in the blood of a large number of larvae of *Agrotis pronuba*, the infestation apparently being benign in character and never causing death. Infestations by flagellates in the body cavity of insects are rare, though they are common in the digestive tract. Infected larvae were all also parasitised by larvae of the Ichneumonid, *Amblyteles armatorius*, Först., non-parasitised larvae being free from flagellates. It appears, though it has not been proved, that the infected Ichneumonid inoculates the protozoon in the act of oviposition, the former being merely a vector, and not playing any indispensable part in the evolution of the flagellate.

GREEN (E. E.) & LAING (F.). **Descriptions of some new Species and some new Records of Coccidae. I. Diaspidinae.**—*Bull. Ent. Res.*, xiv, pt. 2, pp. 123–131, 11 figs. London, October 1923.

The new species described are *Dinaspis veitchi*, from the stem of an unknown plant in Fiji; *Pinnaspis pattersoni*, from the Gold Coast, on bark of *Rauwolfia vomitoria*; *Fiorinia* (*Adiscofiorinia*) *pygosema* and *Gymnaspis bilobis* on a plant of the mangrove type, and *Aspidiotus* (*Targionia*) *prionota* on the bark of an undetermined forest tree, from Tanganyika Territory; *Aspidiotus* (*Aonidiella*) *ritchiei* on bark of *Cassia fistula*, *A.* (*A.*) *multiclavata* on redwood tree (*Erythroxylon areolatum*), and *Pseudaonidia subtesserata* on Congo peas, from Jamaica; *Aonidia truncata* on leaves of an unknown plant, from Queensland; and *Lepidosaphes* (*Coccomytilus*) *lantanae* on *Lantana* sp., from Argentina. *Aspidiotus pangoensis*, Doane & Ferris, is recorded from the trunk of a coconut palm in Fiji. *Pseudaonidia iota*, Green & Laing, is regarded as a synonym of *P. clavigera*, Ckll. *Odonaspis saccharicaulis*, Zehnt., which was reduced by Cockerell to a variety of *O. secreta*, Ckll., is considered a distinct species.

BOX (H. E.). **The Bionomics of the White Coffee-leaf Miner,** *Leucoptera coffeella*, **Guér., in Kenya Colony (Lepidoptera, Lyonetiidae.)**—*Bull. Ent. Res.*, xiv, pt. 2, pp. 133–145, 9 figs. London, October 1923.

This is an amplification of a paper that has previously been noticed [*R.A.E.*, A, x, 490]. A comparison of the life-cycle of *Leucoptera coffeella*, Guér. (white coffee leaf-miner) in various countries is tabulated, and a list is given of the parasites recorded from it. During experiments in Kenya Colony, three species of Hymenoptera have been reared from this moth. One of these is a Braconid, of a genus allied to *Hormius*, which is scarce in the region and of practically negligible value; another is the Eulophid, *Atoposoma variegatum*, Masi, var. *afra*, Silv. The third is thought to be also a Eulophid of the genus *Chrysocharis*. The two Eulophids are undoubtedly of value, especially the former. At certain seasons, most of the blotches made by the larvae of *L. coffeella* contained 2 or 3 empty pupa-cases, and they were especially numerous after a rather severe drought. From December to mid-January the percentage of blotches containing parasites was about 25, during February 45 to 50, and the number gradually decreased to almost nil in May.

As burning the infested leaves destroys parasites as well as pests, the leaves should be picked at the time of greatest abundance of the larvae, and the parasites as they emerge should be allowed to escape.

The Mocha variety of *Coffea arabica*, which is the principal kind grown in Kenya, is more susceptible to attack than Blue Mountain, though the latter may be heavily attacked in the absence of the former.

CHAMBERLIN (J. C.). **A Systematic Monograph of the Tachardiinae or Lac Insects (Coccidae).**—*Bull. Ent. Res.*, xiv, pt. 2, pp. 147–212, 11 plates, 8 figs. London, October 1923.

In preparing this monograph, 44 species have been examined, and they are all described and figured, but it is estimated that not more than half, and probably not more than one-third, of the actual number of species in this subfamily are at present known. The geographical distribution, ecology and economic importance of the group are discussed. Various species have been suggested as possible sources of lac, but it is only within the genus *Tachardia* that it has been found possible to recover it, although the species of all the genera except *Tachardina* secrete a true lac. As pests, these Coccids seem to be of little importance, though they have been reported on various trees of economic value, and occasionally in sufficient numbers to be harmful. The method of production of lac and the comparative morphology of each species are discussed.

A new genus, *Austrotachardia*, is erected with *Tachardia angulata*, Frogg., as the type. The new species described are *Tachardia meridionalis* on an unknown food-plant from Australia; *T. greeni*, from the Philippine Islands, on *Ficus ulmifolia*; *T. ebrachiata*, from India, on manbhum; *Tachardiella ferrisi*, from Lower California, on *Acacia flexicaulis*; *T. texana*, from Texas, on *Acacia* sp.; *Tachardina brachysetosa*, from Uganda, on *Anona muricata*; *T. ternata*, from India, on *Acacia sundra*; and *T. lobata*, from Ceylon, on *Fluggea leucopyrus*. Two new forms are also described.

SCHINDLER (—). **Le** *Phyllognathus silenus*, **Fabr., nuisible à la vigne au Maroc.**—*Bull. Soc. Sci. nat. Maroc.*, iii, no. 5–6, pp. 120–121, 1 plate. Rabat, 30th July 1923.

Phyllognathus silenus, F., has been causing considerable injury to new vineyards on sandy soil near the sea in Morocco; the new slips are attacked and may be cut right through. Collection of larvae and adults has given promising results.

This Dynastid beetle has also been recorded from similar vineyards in Sicily and Italy. In laying out a new vineyard on suspected ground the slips are enclosed in hollow briar twigs. These are not attacked by the larvae, and by the time they decay, the vine will have become firmly established.

GRIFFIN (E. L.), NEIFERT (I. E.), PERRINE (N.) & DUCKETT (A. B.). **Absorption and Retention of Hydrocyanic Acid by Fumigated Food Products.**—*U.S. Dept. Agric.*, Dept. Bull. 1149, 16 pp., 1 plate, 9 tables. Washington, D.C., 9th May 1923. [Received 23rd October 1923.]

Experiments have been undertaken in order to ascertain how much hydrocyanic acid is absorbed under ordinary conditions of fumigation, and at what rate it is given off when exposed to the air, details of which

are given. No conclusions are drawn as to the safety of fumigated foods for consumption, chemical observations alone being included.

Products with hard skins absorb less than those of a succulent nature or those that contain chlorophyll. Some fruits and vegetables are rendered unmarketable owing to physical injury (softening and discoloration). In the case of seeds most of the hydrocyanic acid is rapidly dissipated. Though flour absorbs a large quantity of the gas, it gives it off almost as quickly, so that after four days or a week at most, no trace of the fumigant can be found. Removal of the gas under a vacuum after fumigation will not get rid of the absorbed hydrocyanic acid. The concentration of the gas used generally has a marked effect on the quantity absorbed by the product.

Cook (F. C.) & McIndoo (N. E.). **Chemical, Physical, and Insecticidal Properties of Arsenicals.**—*U.S. Dept. Agric.*, Dept. Bull. 1147, 57 pp., 23 tables. Washington, D.C., 9th June 1923.

A joint investigation was undertaken by the Bureau of Chemistry and the Bureau of Entomology of the United States Department of Agriculture to study the properties of various arsenicals on the market, so as to be able if possible to improve them and produce new arsenicals for insecticidal purposes. The results are described in detail. Contrary to the general belief, they indicate that the toxicity of arsenious oxide varies greatly and is dependent on the degree of fineness of the crystals, which influences the percentage of water-soluble arsenious oxide present. In no case did its toxicity equal that of an equivalent amount of arsenic oxide present in acid lead arsenate.

Acid lead arsenate may be recommended in general when an uncombined arsenical is to be used. Its adhesive and insecticidal properties are excellent, and it causes very little if any scorching of the foliage. It is compatible with nicotine sulphate solutions and Bordeaux mixture, but not with lime-sulphur, at least from a chemical standpoint. A powdered acid lead arsenate contains about 32 per cent. of arsenic oxide and about 64 per cent. of lead oxide, while powdered basic lead arsenate contains about 23 per cent. of arsenic oxide and about 73 per cent. of lead oxide.

The alkalies contained in soap decompose arsenicals, though a smaller amount of soluble arsenic is formed when calcium arsenate is mixed with sodium fish-oil soap than when the latter is mixed with acid lead arsenate. Acid lead arsenate, therefore, should not be used in preparing kerosene-emulsion sprays, as the mixture is chemically incompatible.

Other results in connection with the chemical compatibilities and incompatibilities of the various arsenicals, fungicides, and other materials tested are also given. Chemically compatible combinations are: Lime-sulphur and calcium arsenate; nicotine sulphate and lead arsenate; and Bordeaux mixture with calcium arsenate, acid lead arsenate, zinc arsenite, or Paris green. Chemically incompatible combinations are: Soap solution with either calcium arsenate or acid lead arsenate; kerosene emulsion with either calcium arsenate or acid lead arsenate; and lime-sulphur with acid lead arsenate, though the last-named combination has been used successfully in large quantities in the field. A combination of nicotine sulphate and calcium arsenate besides producing free nicotine also produces soluble arsenic unless a decided excess of free lime is present. No soluble arsenic was obtained on combining sodium arsenate with Bordeaux mixture.

It would appear that soluble arsenicals are more toxic per unit of arsenic than are the insoluble ones, the greater toxicity being due to the water-soluble arsenic present in the compound or to the arsenic that is quickly rendered soluble inside the insects. Data obtained during these investigations suggest that the amount of arsenic present per unit of sprayed leaf is larger when a soluble arsenical is used in combination with a fungicide than when an insoluble arsenical is used. It may thus be possible to explain chemically the increased activity or efficiency when sodium sulphide is used with arsenicals. Apparently it is not always true that an insecticide containing a high percentage of arsenic is more toxic than one containing less arsenic, as toxicity depends not alone upon the amount of arsenic present, but also upon its form of combination. The insecticidal part played by the base itself is small and sometimes non-existent. The addition of lime or Bordeaux mixture reduces the toxicity of arsenicals, the calcium present apparently preventing or counteracting the formation of soluble or more toxic arsenic compounds.

From the reported results, it would appear that if all seven species of insects used had been tested under similar conditions, their susceptibility to an acid lead arsenate would probably be in the following order, beginning with the most susceptible insect: *Apis mellifica*, L., *Bombyx mori*, L., *Melanoplus femur-rubrum*, DeG., larvae of *Leptinotarsa decemlineata*, Say, *Malacosoma americana*, F., *Hyphantria textor*, Harr., and *H. cunea*, Dru.

Commercial arsenicals used for sprays or dusting purposes are usually judged chemically on the basis of the total arsenious or arsenic oxide contents and on the percentages of the total amount of these oxides that goes into solution under certain conditions. The percentage of base present is also determined. Soluble arsenic oxides or arsenic rendered soluble after the application of arsenicals will scorch foliage, the extent of injury depending mainly on the amount of soluble oxide present or formed in the spray or solution applied. As indicated above, it is the soluble arsenic or the arsenic rendered soluble by the insects that causes death. The rapidity with which the arsenicals are made soluble in the body of the insect seems to be the most important factor in connection with their toxicity. Part of the soluble arsenic inside the body of the insect passes through the intestinal walls into the blood and is distributed to all parts of the body, a small portion reaches the nervous system, but what happens to the remainder is not known.

The usual lead arsenate on the market, acid lead arsenate ($PbHAsP_4$), is well standardised and stable. Basic lead arsenate ($Pb_4PbOH(AsO_4)_3$), also well standardised and stable, is being manufactured at present only to a limited extent. Chiefly because of its low arsenic and high lead contents, basic lead arsenate is more stable and therefore less likely to scorch foliage than acid lead arsenate. It possesses weaker insecticidal properties and is somewhat more stable in mixtures than acid lead arsenate. Commercial calcium arsenate, the manufacture of which is rapidly becoming standardised, contains more lime than is required to produce the tribasic form. Paris green is less stable and contains more soluble arsenic than commercial lead or calcium arsenates. Excellent insecticidal results were obtained with laboratory samples of aluminium arsenate, barium arsenate, and a mixture of the arsenates of copper and barium. Acid lead arsenate and zinc arsenite were the most and Paris green the least adhesive, on potato foliage, of the

arsenicals tested. The addition of lime did not increase their adhesiveness.

The toxicity findings are based on the use of equivalent quantities of arsenious and arsenic oxides. Higher percentages of toxicity were found for acid lead arsenate than for basic lead arsenate. The different samples of calcium arsenate varied widely in toxicity. The average toxicity of three samples of Paris green and that of one of zinc arsenite was slightly more than that of an acid lead arsenate and a sodium arsenate. Of the four samples of arsenites, Paris green gave the highest values, zinc arsenite being much less toxic. Based on equivalent metallic arsenic percentages, the Paris green samples gave values no higher than that of the acid lead arsenate tested. The toxicities of the several new arsenates were lower than that of acid lead arsenate. Of the various bases, lead oxide showed some insecticidal value, while the oxides of zinc, magnesium and copper showed little and calcium no value. Arsenic acid, acid lead arsenate, and one sample of calcium arsenate gave high and practically equal toxicities. Arsenious oxide (white arsenic) gave lower and variable results. The percentages of water-soluble arsenic in the original arsenicals had little or no influence on the toxicity, except in the case of those arsenicals that were entirely or largely water soluble, and these had high percentages of toxicity.

A determination of reaction in terms of the pH value of water extracts from the bodies of insects indicates that the arsenic compounds ingested did not affect the pH values as determined on dead insects.

From these investigations it is concluded that a chemical analysis of an arsenical does not give sufficient data to judge its insecticidal properties satisfactorily, and a toxicity study alone does not show that an arsenical is suitable for general insecticidal purposes; for satisfactory results a combination of both is desirable.

Britton (W. E.). **Twenty-second Report of the State Entomologist for 1922.**—*Connecticut Agric. Expt. Sta.*, Bull. 247, pp. 269–381, 16 plates, 11 figs. New Haven, Conn., 1923.

Pests intercepted on imported nursery stock included a cocoon of *Diprion* on fruit stock, and *Nygmia phaeorrhoea*, Don. (*Euproctis chrysorrhoea*, L.) on apple, from France; *Emphytus cinctus*, L., on manetti rose, from England, France and Holland; and *Rhabdophaga salicis*, Schr., causing galls on osiers, from Holland.

An outstanding feature of 1922 was the rapid spread of *Hemerophila pariana*, Clerck (apple and thorn skeletoniser) [*R.A.E.*, A, xi, 335, 381]. In experiments on *Heliothis* (*Chloridea*) *obsoleta*, F. (corn ear worm), begun in the autumn of 1921, no adults or parasites were obtained in 1922 from the larvae that had pupated in the usual manner, indicating that this moth may not be able to survive the winters in Connecticut. Further information has been obtained regarding the egg stage of the euonymus scale [*Chionaspis euonymi*, Comst.], which in Connecticut at least produces eggs in May and hibernates as a partly grown female. It was not possible to ascertain whether it is single or double brooded. *Anomala orientalis*, Waterh., a native of Japan, was found in a nursery in 1920 and 1921, but no further beetles have been collected.

Aegeria (*Sesia*) *rhododendri*, Beutm. (rhododendron borer) has been causing damage in the last two years. The eggs are usually laid singly on small twigs. The larvae tunnel in the sap-wood and inner

bark, causing a complete girdling of the twig or branch. They are half-grown by the end of August, and many mature at the end of October, remaining dormant throughout the winter. Pupation occurs in May, and lasts about 15 days. In 1922 adults emerged from 16th May to 6th June. A description of the egg, larva and adult is given. According to Dr. Felt, a Hymenopterous parasite, apparently a species of *Macrocentrus*, has been reared from infested branches. Wounds caused by the borers should be cut and protected from further attack and decay, and may be coated with melted paraffin or covered with grafting wax. All dead and badly infested stems and branches should be burned.

Glycobius (Plagionotus) speciosus, Say, severely injures the sugar maple [*Acer saccharinum*], particularly in the north-eastern States. Attacks are confined to the trunk and base of the larger branches, which usually show red or yellow foliage in late summer whilst the healthy ones are still green. Dead areas are later attacked by borers of secondary importance, such as *Aegeria (Sesia) acerni*, Clem., and *Tremex columba*, L. The adults emerge during the first half of July in Connecticut and oviposition takes place in July or early August. The larvae tunnel in the bark and sap-wood. Two years are supposed to be required for the life-cycle. All dead trees and branches and those nearly dead should be removed, preferably before June, and many borers may be killed by running wires into the burrows. Injecting carbon bisulphide is effective if the tunnel is gas tight and the opening is subsequently closed with grafting wax, paraffin wax or moist soap.

Aegeria acerni is a minor pest of maple trees and seldom attacks healthy ones. Eggs are laid on roughened areas on the bark near wounds in May or June, the larvae tunnelling into the bark and sap-wood, reaching about ½ in. by the end of the season, when they hibernate. They resume feeding in the spring, eat their way nearly to the surface and retire into the tunnel to pupate. There is only one generation a year. Woodpeckers appear to be the most important natural enemies of this moth.

Chermes abietis, L. (spruce gall aphis) is one of the most serious spruce pests in Connecticut. Though several species of spruce are attacked, the Norway spruce, *Picea excelsa*, seems to be more susceptible and more seriously injured than others. Spraying in April with a contact spray to kill the over-wintering females is the best remedial measure. Kerosene emulsion has not been found effective, but fish-oil soap, 1 lb. in 2 U.S. gals. water, is recommended. For several years trees have been effectively sprayed with 1 part miscible oil in 20 parts water in April and late in the autumn. *C. cooleyi*, Gill., also occurs in Connecticut and makes larger galls on the blue spruce, *P. pungens*.

Many cut-leaf white birches [*Betula alba* var. *laciniata*] have died in the past years after attacks by *Agrilus anxius*, Gory (bronze birch borer). Other trees have also been killed, but in most cases they have been the European white birch, *Betula alba*. Native birches are not wholly immune, but seem to be less susceptible. Ridges or swellings may be observed on branches ½ to 1 in. in diameter before anything wrong is detected with the foliage. There is one generation a year, the larvae hibernating under the bark and pupating early in May. The adults emerge late in May or early in June and probably oviposit in June or July in the crevices of the bark. The larvae

mature in October. The adult beetles feed to some extent on the foliage of willow, poplar and probably birch. Woodpeckers feed on the larvae, and a small Chalcid, *Phasgonophora sulcata*, Westw., has been reared from the galleries in New York State. All dead and infested trees and branches should be cut out and burned before the 15th May. Only prompt community efforts will check the devastations of this Buprestid.

Brief notes are given on other pests. Those attacking fruit are *Malacosoma americana*, F., *Cydia* (*Laspeyresia*) *molesta*, Busck, *Eucosma* (*Tmetocera*) *ocellana*, Schiff., *Alsophila pometaria*, Harr., *Rhagoletis pomonella*, Walsh, *Marmara elotella*, Busck, *Conotrachelus nenuphar*, Hrbst., *Ceresa bubalus*, F., *Anuraphis roseus*, Baker, *Paratetranychus pilosus*, C. & F., *Lygidea mendax*, Reut., *Psylla pyricola*, Först., *Macrodactylus subspinosus*, F., and *Oberea bimaculata*, Ol. Vegetables were attacked by *Papaipema nitela*, Guen., *Leptinotarsa decemlineata*, Say, *Epicauta marginata*, F., *Macrosiphum solanifolii*, Ashm., *Aphis pseudobrassicae*, Davis, *Diabrotica vittata*, F., and cutworms. Shade and forest trees were attacked by *Galerucella luteola*, Müll., *Haltica ulmi*, Woods, *Plagiodera versicolor*, Laich, *Hyphantria cunea*, Dru., *Phenacoccus acericola*, King, *Bucculatrix canadensisella*, Chambers, *Argyresthia thuiella*, Pack., and *Antispila nyssaefoliella*, Clem. Miscellaneous insects, some of which are recorded by other authors, are *Mononychus vulpeculus*, F., injuring iris blossoms; *Dichomeris marginellus*, F., infesting junipers; *Pityophthorus ramiperda*, Swaine, in pine twigs; *Pegomyia calyptrata*, Zett., in cultivated sorrel; *Hadrobregmus carinatus*, Say, in timbers of an old house; *Adirus trimaculatus*, Say, in rose stems; *Feltia venerabilis*, Wlk., on pansies; and *Gelechia abietisella*, Pack., on hemlock spruces.

Britton (W. E.) & Ashworth (J. T.). **Report of Work in suppressing the Gipsy and Brown-tail Moths. Season of 1921–1922.**—*Connecticut Agric. Expt. Sta.*, Bull. 247, pp. 290–326, 2 figs. New Haven, Conn., 1923.

A detailed account is given of the work carried out against the gipsy moth [*Porthetria dispar*]. There was no marked change in the methods used compared with preceding years. In the autumn of 1921 it was found that there had been an extensive wind-spread of the moth, which scattered the existing colonies and extended these over many towns in the west and south that had hitherto been free. Such wind-spreads occur only occasionally and may not happen again for many years, and this is perhaps the most extensive one known in Connecticut since the State became infested.

A review is given of the rearing, colonisation and recovery of various enemies and parasites. Those attacking *P. dispar* are *Calosoma sycophanta*, L., *Anastatus bifasciatus*, Boy., *Schedius kuvanae*, How., *Apanteles fulvipes*, Hal., *A. melanoscelus*, Ratz., *Monodontomerus aereus*, Wlk., *Blepharipa scutellata*, Desv., *Compsilura concinnata*, Mg., and *Sturmia* (*Zygobothria*) *nidicola*, Towns.; and those attacking the brown-tail moth [*Nygmia phaeorrhoea*] are *Apanteles lacteicolor*, Vier., *Pteromalus egregius*, Forst., and *Meteorus versicolor*, Wesm. The recent (July 1922) extension of the quarantined area on account of the spread of the gipsy moth in Connecticut is given. *Nygmia phaeorrhoea* has been absent throughout the State, so that no measures against it were necessary, except to destroy a few larvae in their nests when found on imported nursery stock

ZAPPE (M. P.). **Tests of Paradichlorobenzene as a Remedy for the Peach Borer.**—*Connecticut Agric. Expt. Sta.*, Bull. 247, pp. 331–332. New Haven, Conn., 1923.

In September 1921 peach trees were treated with paradichlorobenzene against *Aegeria* (*Synanthedon*) *exitiosa*, Say (peach borer); and on examination in May 1922 it was found that the treatment had reduced the average number of living borers from nearly 2 to a tree to an average of 0·62. Most of the living borers were found above the mound of soil covering the paradichlorobenzene, and if the mound had been made higher, it is probable that few would have survived. The trees showed no indication of injury from the treatment.

ZAPPE (M. P.). **Cabbage Root Maggot Experiments.**—*Connecticut Agric. Expt. Sta.*, Bull. 247, pp. 332–333. New Haven, Conn., 1923.

Phorbia brassicae, Bch. (cabbage root maggot) was not very abundant, and only about 15 per cent. of untreated plants were killed. A description is given of tests with corrosive sublimate, tobacco dust and hydrated lime, and tarred paper discs. The corrosive sublimate treatment and tarred paper discs showed about equal control, though the former is cheaper and easier to apply, 1 oz. being enough to treat 150 plants.

GARMAN (P.). **Work with the European Red Mite in 1922.**—*Connecticut Agric. Expt. Sta.*, Bull. 247, pp. 333–338. New Haven, Conn., 1923.

Paratetranychus pilosus, C. & F., appeared early in 1922 and by the middle of June had caused considerable foliage injury. Heavy rains then set in and continued till late in the summer, resulting in only a slight increase of the mites, or in most cases a decided decrease in relative numbers. Dates are given of oviposition and hatching; the life-cycle in August is approximately 17 days, though longer in cold weather. Winter eggs were found on 15th September. The adults were kept alive in June for 3 weeks, and one individual laid 34 eggs during this time. It also appears that approximately half the life period is passed as an egg, which in midsummer may remain a week before hatching. Sprays that do not affect the egg should be repeated in 10 days (allowing 8 days for the mites to mature and 2 days before egg-laying begins), but if more sprays are applied, the third should not necessarily follow at this interval, but could be delayed 14–18 days without loss in efficiency. Fish-oil soap, laundry soap and sulphur, linseed oil emulsion, and lime-sulphur combined with lead arsenate and nicotine sulphate gave control in 1922. A dust containing nicotine, lead arsenate and sulphur was not effective. The relative cost of the successful sprays is given. Fish-oil soap is the cheapest, and fungicides could be added to it without making it too expensive. Linseed oil emulsion comes next, but it is not safe to add arsenates to either of these sprays, and additional treatments are necessary to control chewing insects. It is not necessary to add nicotine sulphate to fish-oil soap, though the addition of it would help in controlling Aphids.

GARMAN (P.). **The Occurrence of several new Spider Mites in Connecticut.**—*Connecticut Agric. Expt. Sta.*, Bull. 247, pp. 338–340, 2 figs. New Haven, Conn., 1923.

The species dealt with are *Tenuipalpus lineola*, C. & F., which feeds on the lower surface of leaves of elder, *Sambucus canadensis*; *Tetranychus populi*, Koch, which infests poplar; *Schizotetranychus schizopus*, Zacher, on willows; *Paratetranychus bicolor*, Banks, which infests oak and is also found on chestnut and birch; and *Oligonychus americanus*, Ewing, which in Canada is reported to cause severe injury to spruce and evergreens. The presence of *O. americanus* in Connecticut had not been recognised prior to 1922, owing to its having been considered identical with *P. ununguis*, Jac.

GARMAN (P.). **Notes on the Life-history of the Spruce Mite,** *Paratetranychus ununguis*, **Jacobi.**—*Connecticut Agric. Expt. Sta.*, Bull. 247, pp. 340–342, 1 fig. New Haven, Conn., 1923.

Paratetranychus ununguis has been observed on various conifers in Connecticut and is capable of doing much harm, especially to young trees. The attacks cause the needles to turn brown and drop off. Hibernation occurs in the egg stage, usually at the base of the needles. In 1922 the eggs hatched on 25th April, and mites infested the trees until the autumn, winter eggs being deposited about the 1st October. The incubation period varies from 5 days at 80–90° F. to 13 days at 62° F., averaging about 11 days at 70°. After the egg hatches, the period of development to the adult requires about 5 days at 80–90° F. or 13 days at 62·7° F. At 69° F. the period lasted 9 days. There is a pre-oviposition period of 1–4 days. A total period from egg to adult of 11–23 days was obtained, the shortest under natural conditions being 14. Adult females were kept alive 6–8 days, but probably live much longer in nature.

WALDEN (B. H.). **Nicotine Dust as a Control for the Turnip Aphid.**—*Connecticut Agric. Expt. Sta.*, Bull. 247, pp. 346–347. New Haven, Conn., 1923.

Swedish turnips that were heavily infested with *Aphis pseudobrassicae*, Davis, were effectively dusted with a sulphur nicotine dust containing 5 per cent. nicotine sulphate, equivalent to 2 per cent. of nicotine.

RILEY (W. A.) & Others. **Division of Entomology and Economic Zoology.**—*30th Ann. Rept. Minnesota Agric. Expt. Sta., 1921–22*, pp. 68–73. Univ. Farm, St. Paul, Minn., 1922. [Received 27th October 1923.]

The effects of the processes of manufacturing macaroni in destroying *Calandra* (*Calendra*) *granaria* have already been noticed [*R.A.E.*, A, xi, 484].

Carbon tetrachloride either alone or in combination with other chemicals is being much used instead of carbon bisulphide for fumigation purposes to avoid the danger of fire. When paradichlorobenzene is dissolved in carbon tetrachloride, the mixture fractionates upon evaporation. About 1 per cent. of the paradichlorobenzene goes off with the carbon tetrachloride regardless of the original concentration. This means that the toxicity of the latter cannot be very

greatly changed; but the distribution of the paradichlorobenzene is greatly facilitated by having it in a solution rather than as a solid. Results from fumigation show that it is very difficult to get rid of the odour of paradichlorobenzene, and this may render it unsuitable as a fumigant for grain.

Experimental work on the nutritional requirements of *Tribolium confusum* confirms the results already reported [*R.A.E.*, A, x, 313]. *Ptinus fur* has recently been introduced into Minnesota and is being spread through commerce.

It has been found that slash burning is not so effective a factor in forest pest control as has generally been believed. It is better to leave the slash piled in such a way that most of the material of large diameter is laid close to the ground and covered with the finer particles. So far as possible the piles should be built over stumps, thus reducing still more the possible breeding-places of potentially dangerous forest insects. Sunlight is the most important factor influencing insect development in freshly cut logs. In direct sun the sub-cortical temperature in many logs exceeds the fatal point for most species. Different degrees of shade determine to a considerable extent the amount of infestation, and differences in temperature resulting in differences in shade have a decided influence on the rate of development of larvae and thus on the rate of injury.

The apple maggot [*Rhagoletis pomonella*] has become a serious problem in the last three years. Adults were found from the end of July to the end of September. Maggots were found from August to December. In the hard varieties they did not develop until after the pulp had begun to soften. The only feasible remedial measure depends on the fact that the adult flies are on the wing for a considerable period before oviposition, when they obtain moisture and nourishment by rasping the surface of fruit and leaves, and so may be exposed to an arsenical spray.

MALLOCH (W. S.). **The Problem of Breeding Nematode-resistant Plants.**—*Phytopathology*, xiii, no. 10, pp. 436–450, 2 figs. Lancaster, Pa., October 1923.

Experiments carried out to find in what plants *Heterodera radicicola* is mutually interchangeable confirm the opinion that there are no physiological or biological strains of this Nematode. This is a distinct advantage to the breeding of Nematode-resistant plants, for once a resistant plant is found, it should be resistant to any new infestation of *Heterodera radicicola*. Such a condition is a disadvantage, however, in crop rotation, as the same strain of *H. radicicola* will attack many of the crops that would be desirable for rotation purposes.

Lists are given of plants examined during the year and found affected by *H. radicicola*.

BONCQUET (P. A.). **Discovery of Curly Leaf of Sugar Beets in the Argentine Republic.**—*Phytopathology*, xiii, no. 10, pp. 458–460. Lancaster, Pa., October 1923.

Curly leaf disease of sugar-beet, caused by the leaf-hopper, *Eutettix tenella*, Baker, is reported from Argentina. The bionomics of the pest appear to be the same in South as in North America.

PHILLIPS (V. T.). **A Revision of the Trypetidae of North-eastern America.**—*Jl. N. Y. Ent. Soc.*, xxxi, no. 3, pp. 119-155, 2 plates. Lancaster, Pa., September 1923.

Keys are given for the identification of the Trypetids occurring in north-eastern America, covering the area extending north to the Laurentian Mountains, westward including Minnesota, and southward including Kentucky and Virginia. Those dealt with include three new species, and two new genera are erected.

BAGNALL (R. S.). **Brief Descriptions of New Thysanoptera.**—*Ann. & Mag. Nat. Hist.*, xii, no. 71, pp. 624-631. London, November 1923.

This is a continuation of a previous paper [*R.A.E.*, A, ix, 599]. The species dealt with include: *Dendrothripoides ipomeae*, gen. et sp. n., on *Ipomea staphylina*, in India; *Bregmatothrips ramakrishnae*, sp. n., in leaf tips of sugar-cane, in India; *B. saccharicola*, sp. n., on green sugar-cane, in Khartoum; *Dactylothrips australis*, gen. et sp. n., from dead wattle (*Acacia dealbata*), in Australia; and *Lamillothrips typicus*, sp. n., and *L. pennicollis*, sp. n., with other species in tunnels of a moth borer in cacao stems, in the Gold Coast.

HILL (G. F.). **New Termites from Central and South-east Australia.**—*Proc. Linn. Soc. N.S.W.*, xlviii, pt. 2, pp. 40-48, 21 figs. Sydney, 15th June 1923.

The new species described are *Coptotermes sedulus*, from Victoria, and *Eutermes fieldi* and *E. tribulus*, from Central Australia.

FROGGATT (W. W.). **Forest Insects of Australia.**—Med. 8vo, viii + 171 pp., 46 plates, 32 figs. Sydney, Forestry Commissioners of N.S.W., 1923. Price 7*s.* 6*d.*

In this profusely illustrated book, the author has supplemented the previous scanty data on the forest insects of Australia with many of his own observations. The three opening chapters include discussions of galls, termites (including notes on their damage to Australian railway sleepers in India), and the wood-boring beetles of timber trees; the danger of the introduction, and subsequent establishment, of such pests from the importation of untreated timber from Malaya and the Pacific Islands would seem to call for protective legislation. The remaining eighteen chapters deal with the pests of the various groups of trees, including brief descriptions and notes on their life-histories.

Like their food-plants, these forest pests are peculiar to Australia, and differ from similar insects in other parts of the world on account of the dominance of the two large groups, *Eucalyptus* and *Acacia*, and by the absence of oaks, chestnuts, poplars, and the indigenous wild fruit-trees of the Old World.

It has been observed that each of the more stunted trees of the western regions, such as *Brachychiton* spp., *Casuarina* and others, has its own particular insect fauna; also that when a particular species of *Eucalyptus*, *Acacia*, or other robust native tree, is grown under artificial conditions, it is much more liable to insect attack, and suffers much more severely from Coccids, borers and foliage-eating insects than when grown under natural conditions. Wattle scrub that springs up on the coastal flats after a forest fire, or has germinated from

naturally dispersed seed, is usually free from mealy-bugs and other scale-insects; whereas, in the same localities, these pests are found attacking planted trees or plants grown from cultivated seed. The life of many of the coastal wattles is limited to ten or twelve years, as, when they reach this age, the bark of the trunk hardens and cracks, giving easy entry to wood-eating beetles and Lepidopterous larvae, which finally kill the tree.

Compared with other parts of the world, the forests of Australia appear to be more liable to insect attack, owing to the absence of woodpeckers, the only bird in Australia capable of destroying insects that have penetrated the bark of a tree being the black cockatoo, *Calyptorhynchus funereus.*

QUEENSLAND. **Pest Destroyers Act of 1923.**—10 pp. Brisbane, 20th August 1923.

This Act regulates the sale of insecticides, fungicides, and vermin and weed destroyers.

LAING (F.). **Aphidological Notes (Hemiptera-Homoptera).**—*Ent. Mo. Mag.*, lix, pp. 238–247, 4 figs. London, October–November 1923.

The Aphids dealt with include *Aphis wilsoni*, sp. n., on roots of *Dianthus, Pergandeida stanilandi*, sp. n., on *Urtica dioica*, and *Toxoptera typhae*, sp. n., on *Typha latifolia*, all from England.

WALSH (G. B.). **Strange Pabulum of** *Ptinus tectus*, **Boield.**—*Ent. Mo. Mag.*, lix, p. 258. London, November 1923.

Larvae of *Ptinus tectus* are recorded from Scarborough as damaging packets of desiccated soup; they were also found feeding on waste flour. One larva was found feeding on dried specimens of *Raphidia* sp. and was afterwards reared to maturity.

CHAMPION (G. C.). **An American** *Bruchus* **introduced in Seeds of** *Bixa orellana.*—*Ent. Mo. Mag.*, lix, pp. 257–258. London, November 1923.

A Bruchid introduced into Holland from Paraguay in seeds of *Bixa orellana*, is a well-marked form of *Bruchus bixae*, Drapiez. It will probably be found in England wherever the seeds are imported.

HENDEL (F.). **Blattminierende Fliegen.** [Leaf-mining Flies.]—*Deutsche Ent. Zeitschr.*, 1923, pt. 4, pp. 386–400. Berlin, 15th October 1923.

Of the 26 Agromyzids dealt with in this paper 8 are described as new. A key is given to the European species of *Spilographa*, and to the various genera as characterised by their larval mines.

SCHUMACHER (F.). *Paracletus cimiciformis*, **Heyd., die** *Tetramorium*-**Wurzellaus.**—*Deutsche Ent. Zeitschr.*, 1923, pt. 4, pp. 401–410. Berlin, 15th October 1923.

Previous work in connection with *Paracletus cimiciformis*, Heyd., is summarised, a list of the literature being also given. For the identification of this species an extract is given from Mordvilko's key to the Aphids attacking graminaceous plants [*R.A.E.*, A, x, 58]. *P. portshinskyi*, Mordv., is considered a geographical race of *P. cimiciformis*,

the latter occurring in Central Europe and the former in Southern Europe and as far east as Turkestan. It is also possible that they are connected by intermediate forms. Though *P. cimiciformis* usually inhabits the nests of *Tetramorium*, colonies have also been found under stones where ants were absent. It feeds entirely on the subterranean roots of various grasses and of wheat, the injury being increased as a result of the protection afforded by ants.

Only the apterous forms have so far been recorded from Germany. Though a winged generation appears in the summer, its behaviour and habits are not known. It is possible that the life-cycle varies in different countries; thus in Germany viviparous females that had apparently hibernated in the ants' nest were found in large numbers in the spring, all of them being the same size. It is most unlikely that they had developed outside the nest.

Roark (R. C.) & Keenan (G. L.). **Adulteration of Insect Powder with Powdered Daisy Flowers** (*Chrysanthemum leucanthemum*, **L.**). —*U.S. Dept. Agric.*, Dept. Bull. 795, 9 pp., 2 plates, 1 fig. Washington, D.C., 15th May 1923. [Received 27th October 1923.]

This is a revision of an earlier bulletin on the adulteration of pyrethrum powder [*R.A.E.*, A, viii, 13].

Willard (H. F.). **Work and Parasitism of the Mediterranean Fruit Fly in Hawaii during 1919 and 1920.**—*Jl. Agric. Res.*, xxv, no. 1, pp. 1–7, 3 tables. Washington, D.C., 7th July 1923.

This is a continuation of the work on the parasites of *Ceratitis capitata*, Wied., in Hawaii [*R.A.E.*, A, viii, 170]. The extent of infestations of various fruits by the larvae during 1919 and 1920, as compared with records for 1918, indicates a reduction in the past three years. Many of these reductions occurred in the most preferred fruits, the peach, *Amygdalus persica*, and the Indian almond, *Terminalia catappa*. The peach has always been the most heavily infested fruit in Hawaii, and the average infestation for 1919 was less than for any year since the introduction of parasites. In the case of the Indian almond there was an average decrease of 15 per cent. in 1919 and 44 per cent. in 1920 over that of 1918, this being the first important decrease since records of parasitism were started. The monthly parasitism of the larvae in each fruit by each parasite is detailed. *Diachasma fullawayi* had previously only attacked its host freely in certain fruits, but in 1920 it attacked larvae in all fruits, especially during the latter part of the year, causing the death of 12·1 per cent. of all larvae during the year. *Tetrastichus giffardianus* has also shown an increase over previous years. It is able to attack its host in fleshy fruits, which Opiine parasites cannot do. During 1920 it attacked freely larvae in guavas. The total parasitism of all larvae of *C. capitata* collected in Hawaii during 1919 and 1920 and from 1915 to 1920 in yearly averages is also shown. Owing to the continued activities of the parasites during the past 6 or 7 years, approximately 50 per cent. of the fruit-flies developing have been destroyed during the past 4 years.

HILL (C. C.). *Platygaster vernalis*, **Myers, an important Parasite of the Hessian Fly.**—*Jl. Agric. Res.*, xxv, no. 1, pp. 31–42, 7 figs., 3 tables, 4 plates. Washington, D.C., 7th July 1923.

This paper summarises data collected since 1914 on *Platygaster vernalis*, Myers, a parasite of *Mayetiola* (*Phytophaga*) *destructor*, Say (Hessian fly). It is the most important of the many parasites that normally attack the spring generation of this fly in the mid-Atlantic States. A description is given of all stages. The egg never develops except in the mid-intestine of the host. More young larvae are found in a single host than reach maturity, and individual hosts have been found to contain from 21 to 40 larvae. During the mature larval stage, the host is consumed as far as the cuticle, which is left to enclose the cocoons. The host invariably forms its puparium before being killed, and the hibernating parasites are thus afforded additional protection.

Parthenogenesis may occur in *P. vernalis*. From 1,169 adults that emerged in confinement, about 48 per cent. were females and 51 per cent. males. There are indications that in the polyembryonic development of the parasite the adults produced from a single egg are usually of the same sex. Although experimentally certain individuals deliberately oviposit several times in one egg, they usually avoid doing so. The shortest length of life of the adult was 3 days and the longest 27. Cage rearings checked by field experiments in the winter show that the adults normally remain in the cocoons until early spring. The parasite has been found throughout the eastern wheat-growing region, details being given as to its further distribution. During each year the death-rate has been very high, not less than 81·33 per cent. for any one year, and in 1920 as high as 96·08 per cent. In 1918 at least 45·51 per cent. were killed by competition with other parasites, and at least 46·14 in 1919, but though the high percentage in 1920 is undoubtedly due to the same factor, yet as many puparia contained dead matter and dead *P. vernalis* the entire percentage cannot be accounted for by it. In September 1921 the percentage of death reached about 92, but fully 31·64 per cent. had already been killed as early as June by other Hymenopterous parasites. Though these other enemies are detrimental to the multiplication of *P. vernalis*, they supplement it well enough to effect a very high death-rate in the Hessian fly and also act as a safeguard in the event of a scarcity of the chief parasite.

MARSHALL (G. A. K.). **Three New Species of Curculionidae from Java.**—*Treubia*, iii, no. 3–4, pp. 267–271. Buitenzorg, July 1923.

The new species are *Endaeus calophylli* boring the leaves and twigs of *Calophyllum inophyllum*, *Ctenomerus lagerstroemiae* boring the fruits of *Lagerstroemia speciosa*, and *Alcides cinchonae* boring the twigs of cinchona.

HELLER (K. M.). **Ein neuer Cryptophagine (Coleopt.) aus Java.** [A New Cryptophagine from Java.]—*Treubia*, iii, no. 3–4, p. 275–276. Buitenzorg, July 1923.

Leucohimatiops javanus, gen. et sp. n., has been repeatedly found in tea in Java at the Buitenzorg Experiment Station.

BEZZI (M.). **Eine neue, auf javanischen Chrysomeliden schmarotzende Tachinide (Dipt.).** [A New Tachinid parasitising Javanese Chrysomelids.]—*Treubia*, iii, no. 3–4, pp. 411–412. Buitenzorg, July 1923.

A Tachinid, *Phytorophaga ventralis*, gen. et sp. n., is described from males and females bred from the Chrysomelid beetle, *Phytorus dilatatus*, Jac., at Buitenzorg.

NALEPA (A.). **Eriophyiden aus Java. (4. Beitrag.)** [Eriophyids from Java. Fourth Contribution.]—*Treubia*, iii, no. 3–4, pp. 423–432. Buitenzorg, July 1923.

Descriptions are given of six new species and two new subspecies of *Eriophyes*, one new species of *Paraphytoptus*, and two new species and one new subspecies of *Phyllocoptes*. Lists are given of the galls arranged according to plant orders and of the mites concerned.

MORDVILKO (A. K.). **The Woolly Apple Aphis** (*Eriosoma lanigerum*, **Hausmann) and other Eriosomea.**—**Доклады Росс. Акад. Наук** [*Proc. Russ. Acad. Sci.*], 1923, pp. 40–42. [Petrograd], 1923.

In North America *Eriosoma lanigerum*, Hausm., migrates from its primary food-plant, elm (*Ulmus americana*), to secondary food-plants, such as various species of *Crataegus*, *Sorbus americana* and apple trees. In parts of the United States, where the climate is mild, the larvae resulting from the parthenogenetic females are capable of hibernation, so that it is possible for propagation to continue on the intermediate food-plants without interruption [*R.A.E.*, A, v, 476]. In the author's experience these larvae develop into spurious stem-mothers, which both morphologically and with regard to fertility resemble the true stem-mothers. In other countries where *E. lanigerum* has been introduced with the apple tree and *Ulmus americana* is absent, the cycle of generations becomes incomplete; the exules remain on the apple and propagate parthenogenetically without interruption. The winged sexuparae occurring in August–October appear to be a biological survival. In all Aphids in which migration is compulsory the stem-mother can only develop on the primary food-plant, and this has also been proved in the case of *E. lanigerum* [*R.A.E.*, A, vii, 432]. Should, therefore, the sexuparae of this species deposit their sexual offspring on apple, the resulting fundatrices cannot survive. This method of propagation and its distribution in Europe prove it to be an introduced species. At present it occurs wherever it can survive the winter temperature (not less than −2 to −3° C. [28·4 to 26·6° F.]) and where the summer is not too dry. In North America it appears to withstand −5 to −7° C. [23 to 19·4° F.], but this is probably because the hibernating fertilised eggs are more resistant to low temperatures than are the young larvae of parthenogenetic individuals.

The species of the genus *Eriosoma* seem to have had the following countries of origin. In North America: *E. lanigerum*, Hausm.; *E. rileyi*, Thom., non-migratory; and *E. americanum*, Riley, migrating to roots of *Amelanchier canadensis*. In the Palaearctic Region: *E. ulmosedens*, March. (*phoenax*, Mordv.) occurring in France, Transcaucasia and Turkestan, and apparently non-migratory; and *E. ulmi*, L., migrating to roots of pear. Though *E. ulmosedens* causes galls on *Ulmus campestris* and *U. montana* similar to those of *E. lanigerum* on *U. americana*, the two have proved to be distinct species

[*R.A.E.*, A, vii, 432], as have also *E. ulmi* and *E. americanum*, whereas the Asiatic, Mediterranean and European forms of Aphids of this type are more closely allied and sometimes prove to be only subspecies, as in the case of *E. ulmi japonicum*, Mats., *Tetraneura ulmi yezoensis*, Mats., and *T. pallida japonica*, Mats., although elms do not occur at present in western Siberia. This is explained by the fact that while the far-eastern, Mediterranean and European species probably became separated in glacial times, the North American and Palaearctic species of *Eriosoma* were already isolated in the Pliocene period at least. Before this, the ancestral forms of *Eriosoma*, *Tetraneura* and *Colopha* were probably widely distributed over the Holarctic region. In California and Oregon exules of *E. lanigerum* should be found on *Pyrus rivularis* and *Crataegus rivularis*, whilst those of *Tetraneura graminis*, Monell, and others might occur on roots of Gramineae, from which *T. ulmi*, DeG., has been recorded from the Altai mountains.

In Java and Formosa *T. javensis*, v.d.G., which is probably identical with *T. ulmi yezoensis*, Mats., has been recorded from the roots of sugar-cane (*Saccharum officinarum*) and may probably be found on other Gramineae. Since the disappearance of *Ulmus* from Java it has evidently survived as exules on the roots of grasses.

MORDVILKO (A. K.). **On the Distribution of some groups of Aphids in connection with their Past.—Доклады Росс. Акад. Наук** [*Proc. Russ. Acad. Sci.*], 1923, pp. 43–45. [Petrograd], 1923.

Various instances are given of Aphids in which only parthenogenetic reproduction occurs, and this phenomenon is explained by the disappearance of the original primary food-plant in the course of time. Thus, for instance, species of *Hormaphis* may be found on birch wherever *Hamamelis* existed formerly. *Pemphigella follicularia*, Pass., from leaf galls on *Pistacia vera*, develops when on the roots of Gramineae into a typical *Forda*. And, generally, in other respects, it may be said that *Forda* spp. are the same as *Pemphigella* deprived of their primary food-plant. *Pistacia* has disappeared in North and Middle Europe, but species of *Forda* have survived as exules on the roots of grasses. *Pemphigella*, Tullgren, is therefore considered to be a synonym of *Forda*, Heyden.

In North America *Paraprociphilus tessellatus* migrates from *Acer saccharinum* to *Alnus*, but it is able to produce an uninterrupted series of generations on the latter. A closely allied species, *P. baicalensis*, Cholodk., occurs in Transbaikalia on *Alnus viridis*. Winged forms of this species collected in September proved to be true sexuparae; but these are considered to be merely a biological survival, as the Aphids appear to be only colonists surviving on *Alnus* since the disappearance of some species of *Acer* allied to *A. saccharinum* in that country. It is possible that when *Larix* spp. existed in European Russia during the interglacial period, *Chermes abietis*, L., and *C.* (*Cnaphalodes*) *strobilobius*, Kalt., exhibited the same life-cycle as now in western Europe, but after the disappearance of the larch only the monoecial series of generations on *Picea* remained in the form of *Chermes abietis abietis*, L., and *C.* (*Cnaphalodes*) *strobilobius lapponicus*, Cholodk.

The present life-cycles of *Chermes* (*Pineus*) *pini pini*, Koch, and *C.* (*Dreyfusia*) *piceae*, Ratz., are easily interpreted if it is supposed that the species of *Picea* corresponding to these Chermesids have disappeared from Europe and Siberia. They probably belonged to

the *P. omorica* group, which was widely spread in the tertiary time and has survived in the form of *P. omorica*, *P. ajanensis*, *P. breweriana* and *P. sitchensis*. Of the Chermesids infesting these species little is known with the exception of *C.* (*Gillettea*) *cooleyi*, Gill. The hypothesis that an omoricoid *Picea* was at one time distributed in the Caucasus would explain the existence of *Chermes* (*Pineus*) *pini orientalis*, Dreyfus, in that region, the primary food-plant possibly having been *Picea orientalis*. One must expect to find forms allied to *Chermes* (*Pineus*) *pini* and *C.* (*Dreyfusia*) *piceae* in the Far East of Asia and in North America, and that they will exhibit their full life-cycles wherever the omoricoid species of *Picea* exist.

In North America *C. piceae* has been recorded from *Abies* and *C.* (*Pineus*) *pinicorticis* from *Pinus*.

Attention is drawn to the fact that there existed in Europe other tertiary species of *Picea* that could have served as primary food-plants for Chermesids.

PAILLOT (A.). **Lutte contre la Chéimatobie par les ceintures gluantes.**—*Progrès agric. & vitic.*, lxxx, no. 43, pp. 425–427. Montpellier, 28th October 1923.

The information contained in this paper on the control of *Cheimatobia brumata* has been noticed from another source [*R.A.E.*, A, xi, 340].

FEYTAUD (J.). **L'Arséniate diplombique contre les Vers des fruits.**—*Progrès agric. & vitic.*, lxxx, no. 43, pp. 427–429. Montpellier, 28th October 1923.

From experiments with lead arsenates carried out at the Entomological Station of Bordeaux in 1922, diplumbic arsenate in paste form, as used against the Colorado potato beetle [*Leptinotarsa decemlineata*, Say] is as effective as triplumbic arsenate when used against Lepidopterous larvae attacking grapes, apples and pears. As this substance, in paste form, spreads and adheres well on foliage and fruit, its complete or partial substitution for the triplumbic arsenate is recommended.

GREEN (F. J.). **How to combat Injurious Insects.**—*Qtrly. Jl. Forestry*, xvii, no. 4, pp. 208–224. London, October 1923.

The danger of introducing insect pests into nursery plantations with stock purchased abroad is pointed out, and it is suggested that trouble from such insects would be reduced to the minimum if steps were taken to ensure only clean and healthy plants being used in the nursery. The danger of infested seed applies chiefly to Douglas fir [*Pseudotsuga taxifolia*], which is often attacked by the Chalcid, *Megastigmus spermotrophus*. The remedy is to gather the cones as soon as ripe (the latter half of October) and treat them at once for extraction of the seed, which should then be fumigated with carbon bisulphide. The seed of silver fir (*Abies pectinata*) is sometimes infested with *M. strobilobius*, and may be similarly treated.

The chief soil pests are the larvae of *Melolontha melolontha* (*vulgaris*) (cockchafers), *Agriotes lineatus* (wireworms) and *Tipula oleracea* (leather-jackets). The application of 3 tons per acre of fresh gas lime, ploughed in deeply in early autumn, is very beneficial, but sowing or transplanting should not be done for 4 or 5 months later, owing to the danger to young seedlings. *M. melolontha* is most detrimental to nursery stock, and ploughing should be done very

deeply and before the grubs descend for the resting period. Hand-picking is really the best means for their eradication. *Phyllopertha horticola* (garden chafer) is often very destructive in the nursery, its life-cycle requiring only one year. An excellent preventive against cockchafers is to render the ground repellent for oviposition by applying vaporite lightly to the seedbeds and transplant lines immediately after sowing or transplanting (mid-April or early May). Sand moistened with paraffin is sometimes used in this way, but may do considerable harm to seedlings. Weeds should be kept in check in nursery beds, though the presence of a certain number may sometimes be beneficial, as the rootlets of weeds and grasses are often preferred by the grubs. Traps consisting of pieces of carrot or potato inserted in the soil and examined daily will collect many grubs, and a trench dug round an infested area and baited with farmyard manure will often limit the area of infestation and catch many beetles or grubs. Every encouragement should be given to insectivorous birds in the nursery.

The use of suitable insecticidal sprays for nurseries is discussed, lead arsenate, Paris green and paraffin oil emulsion being recommended. The importance of disinfecting by submersion or fumigating nursery stock either before despatch or after arrival at its destination is pointed out.

In the treatment of woodlands covering large areas, the choice of species that will thrive well and be able to withstand insect attacks in the particular area must be considered, and young plantations should be kept carefully cultivated and judiciously thinned. For unusually heavy infestations over definite areas, it is hoped that aircraft may be used for insecticidal work with good effect. The use of insecticides to any great extent in woodlands is prohibitive in cost, and therefore every effort should be made to benefit by predatory and parasitic enemies of pests by collecting parasitised insects from one locality and transferring them to a newly infested one. The greatest damage by injurious insects generally occurs in coniferous woodlands, where the chief pests are *Myelophilus* (*Hylurgus*) *piniperda* (large pine beetle) and *Hylobius abietis* (large brown pine weevil); lesser pests being *Hylastes ater* (crutch pine beetle), *H. minor* (smaller pine beetle) and *Pissodes notatus* (small brown weevil). For the pine beetles, decoy stems should be placed in various parts of the woods, and as there is generally a second generation of beetles, these stems should be peeled at the end of May for the first generation and at the end of July or early in August for the second; the bark should be burnt on the spot, and the timber sent at once to the saw-mills. For pine weevils, burning refuse on fresh stools is recommended and also traps of fresh bark put inner side downwards on the ground and renewed as soon as they get dry. These should be frequently examined and the insects on them destroyed. Heaps of damp sawdust attract the females for oviposition, and they should be periodically collected and burnt.

GEMMILL (J. F.). **Wheat Bulb Disease.**—*Scottish Jl. Agric.*, vi, no. 2, pp. 192–196. April 1923. [Received 29th October 1923.]

Hylemyia (*Leptohylemyia*) *coarctata*, Fall. (wheat bulb fly) has caused much damage in recent years throughout Scotland, practically wherever wheat is grown following potatoes. Its life-history and habits are described [*R.A.E.*, A, x, 366]. The worst infestation was always

found in fields that had been planted with potatoes in the previous year and had had infested wheat fields adjacent to them. The flies do not migrate far from the wheat fields in which they were reared in order to oviposit. The newly hatched larvae never attack the wheat seeds, but bore into the young plants from the soil at or close above the bulb of the young shoot. They gradually work from the centre in an upward spiral for 1 to 3 in., the plant soon showing discoloration of the bulb and withering of the central blade. In young or poorly growing wheat the whole plant then withers and dies, and the larva may attack three or four plants in turn. It was found practically impossible to destroy the eggs in the soil or the larvae in the plants except by methods so drastic that they would destroy the wheat plants as well; rolling, deep ploughing and poisoning the soil were all useless.

Experiments demonstrated that newly hatched grubs can attack and complete their life-history in barley, rye and couch grass (*Agropyrum repens*), and that they can use these and wheat as alternate food-plants. Oats, ordinary field and sand grasses, potatoes, turnips, cabbage, mustard, etc., were not attacked. Probably couch grass, which is a kind of wild wheat, is the natural wild food-plant of the fly. Fortunately, it is not sufficiently abundant in well-cultivated ground for grubs to be numerous enough to do a great deal of damage. Although it is apparently the natural food-plant, the eggs are laid in abundance on ground entirely free from this grass.

The most promising treatment is to do everything possible to stimulate the growth of surviving plants or shoots. After a potato or other root crop or fallow, no winter variety of wheat, rye or barley should be sown. Since the eggs are laid on such ground and hatch during the spring, this proceeding would greatly reduce the numbers of the fly, perhaps for a number of years, during which the customary rotation could be followed. If this procedure is impossible, wheat should not be sown after early potatoes and not earlier than mid-February. Potatoes that are to be followed by wheat should not be planted close to wheat fields. Couch grass should be eliminated as far as possible. Wheat seed should not be buried too deep for early tillering. If a field becomes so badly damaged that it has to be re-sown, it should be ploughed down rather than grubbed or harrowed, and planted with a crop immune from attack. If soil fumigants are tried against the eggs, this should be done before the wheat is sown and shortly after mid-September, as the grubs within the eggs gradually acquire a resistant covering that protects them from poisons. Cropping of the young wheat during spring by sheep has been tried, apparently with good results, but this method must be tested further before being definitely recommended. Sufficient seed should be sown to secure a fair crop, even if a number of young plants are killed off by the grubs.

THEOBALD (F. V.). **The Winter Washing of Fruit Trees.**—*S.-E. Agric. Coll. Adv. & Res. Dept., Div. Ent.*, Leaflet N.S. no. 1, 4 pp., 1 fig. Wye, Kent, October 1923.

The advantages of winter washes for fruit-trees are pointed out. Hot lime wash is considered the best cleaner and insect destroyer; it is particularly useful in checking *Aphis* (*Anuraphis*) *prunina* (leaf-curling plum Aphid), *A.* (*Anuraphis*) *malifoliae* (leaf-curling apple Aphid) and to a slight extent *Anthonomus pomorum* (apple blossom weevil). Where this wash cannot be applied, caustic soda wash or

Woburn winter wash may be substituted. Against scale-insects, such as *Eulecanium* (*Lecanium*) *ribis*, and *E.* (*L.*) *capreae* on gooseberries and apple, etc., and *Aspidiotus ostreaeformis* (oyster-shell scale) on plum, a lime-sulphur wash is recommended. The usual formulae for these washes are given.

THEOBALD (F. V.). **Entomological Department.**—*Ann. Rept. Res. & Adv. Dept., S.-E. Agric. Coll., 1921–1922*, pp. 5–7. [Wye, Kent, 1923.]

During 1921–22 enquiries concerning insect pests of special interest included: *Cassida fastuosa*, Schall. (*vittata*, F.), causing serious damage to mangels in Mid-Sussex, this beetle being probably spread inland during the war and the dry year of 1921 by means of wild beet or sea spinach; thrips, two species of which were found on cereals in Kent; and the carrot fly [*Psila rosae*, F.], which ruined a large area of celery.

THEOBALD (F. V.). **Entomological Department.**—*Ann. Rept. Res. & Adv. Dept., S.-E. Agric. Coll., 1922–1923*, Appendix B, pp. 5-14. [Wye, Kent, 1923.]

Among the insects recorded during 1922–23 the more important fruit pests were: *Cheimatobia brumata*, L. (winter moth), particularly injurious in East Kent and to a less extent in Sussex; *Thomasia* sp. (raspberry cane midge), most destructive to the variety Bath's Perfection; *Cydia pomonella*, L. (codling moth), which was abnormally abundant; and *Cydia* (*Opadia*) *funebrana*, Tr. (red plum maggot), very injurious to the plum crop.

The pests of cereals and grasses included the Aphids, *Myzus festucae*, Theo., attacking wheat, barley and oats; *Macrosiphum granarium*, Kirby (common corn Aphid), injuring wheat; and *Aphis avenae*, F., and *Siphonaphis* (*A.*) *padi*, L., infesting all cereal crops.

Miscellaneous pests included: *Phorbia* (*Chortophila*) *fusciceps*, Zett., apparently new to Britain, on beans; *Contarinia nasturtii*, Kieff., on swedes and rape in Sussex; *Amblyspatha ormerodi*, Kieff. (red clover midge maggot), unusually injurious to clover in Kent; *Anuraphis warei*, Theo., causing serious damage to wild red clover; *Tylenchus dipsaci*, Kühn, responsible for serious losses to onions; *Epitrix atropae*, Foudr. (belladonna flea-beetle), which seriously damaged the belladonna crops and to some extent the *Datura* and *Hyoscyamus* crops on medical herb farms in Sussex; and a large Aphid, *Myzus* sp. (?), which has been found attacking hops. A list is given of other miscellaneous pests recorded during the year.

Investigations with light traps for catching moths in fruit plantations show conclusively that large numbers of Tortricids may be destroyed in this manner, the species caught including *Tortrix ribeana*, Hb., *T. heparana*, Schiff., *Eucosma* (*Spilonota*) *roborana*, Tr., *Argyroploce* (*Penthina*) *variegana*, Hb., *Eucosma* (*Hedya*) *ocellana*, F., and *Cydia pomonella*, L. An acetylene lamp proved more attractive than a paraffin one.

From a series of experiments carried out on a small scale it would appear that a paste made of 10 lb. of some patent flour with 100 gals. water will destroy 80 per cent. of the red spider, *Tetranychus althaeae*, von Haus, on hops and with a much stronger flour up to 90 per cent. are killed. Colloidal sulphur combined with the paste does not

materially increase its efficacy and when used alone is less efficient, besides causing slight damage to the foliage. *T. althaeae* passes the winter in cracks in the hop poles, in the soil, or at the foot of hedgerows amongst grasses and leaves. It was not found on wild plants in the summer.

Crude naphthaline applied at the rate of 3 cwt. to the acre was found to be effective against leather-jackets, cutworms and cockchafer larvae; wireworms were killed if they could not penetrate deeper than 1½ ft., and in any case the germinating seeds were protected for some time. Applied at the rate of 3–4 oz. per square yard and well watered, it was successful against millepedes attacking cucumbers and tomatos under glass.

THEOBALD (F. V.). **Economic Zoology.**—*Jl. S.-E. Agric. Coll.*, no. 23, pp. 3–12. Wye, Kent, 1923.

Since the last appearance of a report on economic zoology from the College in 1914, 42 papers have been published, a list of which is appended, and notes on the more important of them are given.

The investigations in connection with *Heterodera schachtii* as the possible cause of the nettle head disease of hops have now been completed and prove that this Nematode is not implicated.

REITTER (E.). **Die *Hylobius*-Arten aus Europa und den angrenzenden Gebieten. (Col. Curcul.)** [The Species of *Hylobius* from Europe and the adjacent Regions.]—*Wiener Ent. Ztg.*, lx, no. 1-4, pp. 21–24. Vienna, 25th April 1923. [Received 30th October 1923.]

A key is given to nine species, including *Hylobius angustus*, sp. n. A new subgenus, *Hylobitelus*, is erected for *H. verrucipennis*, Boh.

PRIESNER (H.). **Ein neuer *Oxythrips* (Thysanopt.) aus Oesterreich.** [A New *Oxythrips* from Austria.]—*Wiener Ent. Ztg.*, xl, no. 1-4, pp. 115–117. Vienna, 25th April 1923. [Received 30th October 1923.]

Oxythrips inopinatus, sp. n., is described from Austria, and a key is given to the species of this genus.

Departmental Activities: Entomology.—*Jl. Dept. Agric. Union South Africa*, vii, no. 4, pp. 293–296. Pretoria, October 1923.

An account is given of citrus fumigation in Natal with hydrocyanic acid gas against red scale [*Chrysomphalus dictyospermi*]. An analysis of oranges from trees sprayed with lead arsenate against false codling moth [*Argyroploce leucotreta*] showed that spraying seriously diminishes the acidity of the fruit, while previous experience has shown that it may be rendered insipid and even somewhat nauseous in extreme cases. Care should be taken to exclude insects from all fruit packed for export, as recently several living examples of a small bug, *Ischnodemus diplopterus* (*pusillus*), were intercepted on South African peaches in Britain.

There have been many complaints of fruit-piercing moths this season, and a good deal of the deterioration in export oranges from Rhodesia and the more humid parts of the Transvaal is attributed to these pests. Many can be destroyed by means of baits, and in one

case near Bathurst over 100 dead moths, some *Sphingomorpha chlorea*, but mostly *Achaea lienardi*, were found in two tins containing arsenical fruit-fly bait that had been left near the orange trees. It seems probable that the moths are more readily attracted to bait as the dry season advances and as fruit becomes less abundant. Exposed baits should always be covered with coarse wire netting to prevent animals drinking them.

The tobacco slug [*Lema bilineata*] [*R.A.E.*, A, ix, 186] is now widespread in Natal, the Transvaal, and the eastern districts of the Cape Province. The best insecticide is lead arsenate used as a spray, 1 lb. powder or 2 lb. paste in 40 gals. water. If this is not immediately obtainable, the larvae may be crushed between the fingers, or the plants dusted with finely powdered lime or road dust, care being taken that the dust comes in contact with the larvae. Useless tobacco plants and wild plants should be destroyed. Cattle-dips, disinfectants, etc., should not be used as sprays.

Cydia (*Carpocapsa*) *pomonella* has recently been found in apples and pears in Natal.

Fruit-fly and Cold Storage.—*Jl. Dept. Agric. Union South Africa*, vii, no. 4, pp. 364–365. Pretoria, October 1923.

It has been demonstrated by Mally that larvae of *Ceratitis capitata* (Mediterranean fruit-fly) may survive in cold storage at about 34° for six weeks. This greatly emphasises the need for extreme care in selecting fruit for export, particularly peaches and nectarines.

BACK (E. A.). **Clothes Moths and their Control.**—*U.S. Dept. Agric.*, Farmers' Bull. 1353, 28 pp., 21 figs. Washington, D.C., July 1923.

Brief notes are given on the bionomics of the principal clothes moths, *Tinea pellionella*, L., *Tineola bisselliella*, Humm., and *Trichophaga tapetzella*, L., and more detailed ones on measures against them, with a list of worthless substances and impracticable remedies that are often recommended. The whole forms a very useful survey of the subject.

CHAMBERLIN (F. S.) & TENHET (J. N.). **The Tobacco Flea-beetle in the Southern Cigar-wrapper District.**—*U.S. Dept. Agric.*, Farmers' Bull. 1352, 9 pp., 8 figs. Washington, D.C., July 1923.

Epitrix parvula, F., injures tobacco by eating small irregular holes in the leaves. The tobacco grown in northern Florida and southern Georgia is of the cigar-wrapper type, and even a few punctures detract greatly from its value. Late or second crops of tobacco, now almost entirely discontinued, invariably suffer much more from flea-beetle injury than tobacco planted at the usual time.

The incubation period lasts 11 days in spring and 5 in summer, the corresponding larval stages about 29 and 14 days, and the pupal 7½ and 4½. The adults hibernate, emerging early in the spring, and oviposit in the seed-beds while the plants are still small. One female can lay about 200 eggs. They are laid in the soil near the base of the stalk, but later in the season they are deposited in the soil beneath the lower leaves that rest on the ground. The larvae feed on the tobacco roots and give rise to adults in the first half of May. The adults of the next brood usually appear when the tobacco has matured.

The crops are thus attacked by an over-wintered brood and two later ones. Other wild and cultivated Solanaceous plants are also attacked. A spider, *Peucetia viridans*, Hentz, is the most important natural enemy of the flea-beetle, and a Lygaeid, *Geocoris punctipes*, Say, sometimes attacks it. Birds prey upon it to a certain extent.

Seed-beds should be situated as far as possible from tobacco fields. Frequent light applications of powdered lead arsenate to young plants usually give fairly good protection. Frequent and thorough cultivation should be practised, and weeds in and around fields and tobacco stalks after harvesting should be destroyed. The beetles may be killed in cold weather by burning over their hibernating places. The best results in controlling flea-beetles on young plants in the field have been obtained by frequent light applications of Paris green in dust form. Two applications a week may be made of $\frac{3}{4}$–$1\frac{1}{2}$ lb. Paris green to an acre about three days after the plants have been set out. Larger doses are attended by risk of scorching. Heavy applications of lead arsenate may be used on young plants with comparative safety, but the action of this poison on the beetle is much slower than that of Paris green. Severe infestations by the first spring generation are difficult to control, as no material has been found that will kill the beetles at once without serious damage to the foliage. When the young beetles are emerging from the soil under the plants, light applications of Paris green directed towards the lowest leaves are effective.

CHITTENDEN (F. H.) & ORTON (W. A.). **Increasing the Potato Crop by Spraying.**—*U.S. Dept. Agric.*, Farmers' Bull. 1349, 22 pp., 23 figs. Washington, D.C., October 1923.

This is a revision of an earlier bulletin on spraying measures against the more common pests of potatoes [*R.A.E.*, A, vi, 483].

NEWMAN (L. J.). **Red Legged Velvet Earth Mite** (*Notophallus bicolor*, **Frog.**).—*Western Australia Dept. Agric.*, Bull. 106, 4 pp., 1 fig. Perth, 1923.

The eggs of *Notophallus bicolor* are laid singly on the lower surface of leaves and hatch in 8–10 days, according to the moisture prevailing, dry weather and heat retarding development. The series of moults covers a period of 25–30 days, the total life-cycle taking 30–35 days under suitable weather conditions. The activities of the mites are limited to the period from May to September or October. They disappear when dry warm weather sets in. The Cape weed [*Cryptostemma calendulaceum*] is the chief food-plant; various vegetables, oats, lucerne and clovers are also attacked, but the mite has not been recorded on wheat. Clean cultivation is essential. Seed beds should be carefully watched and seedlings dipped in tobacco water or kerosene emulsion before planting out. Land to be planted with vegetables or other winter crops should be kept under clean fallow for a year, and should be thoroughly limed. The mite prefers light sandy soils and is rarely found on clay soils. Stable manure should not be used as a mulch, and all manure should be dug well in to prevent the surface of the ground from providing shelter. Plants that lend themselves to trellising, such as peas, should be grown, and the lower leaves of

other plants should be removed to reduce shelter. A strip of cleared land should be kept round the crop. The only sprays found effective were nicotine emulsion or kerosene emulsion containing napthaline, and the preparation of these is described.

TRYON (H.). **The Citrus Bug** (*Oncoscelis sulciventris*).—*Queensland Agric. Jl.*, xx, pt. 3, pp. 181–182. Brisbane, September 1923.

The discovery of the over-wintering stage of *Oncoscelis sulciventris* and of its behaviour when brought to the ground in this stage [*R.A.E.*, A, xi, 533] affords a means of capturing it in numbers at a time of year when it was supposed to be absent. An infested orange tree of about 6 or 7 years old was knocked with a padded mallet and no less than 3,650 bugs in this stage were captured. The efficiency of spray fluids has been tested. Black-leaf 40 and resin plus kerosene emulsion have proved fatal when brought into contact with the insects by spraying, lime-sulphur wash also proving effective but having a slower action. Spraying is difficult, as the insects live on the lower surfaces of the leaves and are scattered generally throughout the foliage. *O. sulciventris* is only a minor citrus pest, and its control lends itself to co-operative effort.

VAN HEURN (W. C.). **De schadelijke insecten van de rijstplant op Java.** [Insect Pests of Rice in Java.]—*Meded. Inst. Plantenziekten*, no. 61, xv + 151 pp., 48 figs. Buitenzorg, 1923. Price 2 Florins.

This monograph is intended as a textbook for agricultural officers in Java and gives a concise but comprehensive survey of the various insect pests of rice in that island, especially in its western districts. The pests are arranged by orders, subdivided into families, and the scientific and vernacular names of each species are given, followed by an account of the symptoms denoting infestation by it. The insects, their bionomics, natural enemies and control are described, and in each case a bibliography is given.

A glossary of vernacular names and a name index are other useful features of this work.

VAN HALL (C. J. J.). **Ziekten en Plagen der Cultuurgewassen in Nederlandsch-Indië in 1922.** [Diseases and Pests of Cultivated Plants in the Dutch East Indies in 1922.]—*Meded. Inst. Plantenziekten*, no. 58, 42 pp. Buitenzorg, 1923.

Groundnuts were killed in one instance by the larvae of *Lepidiota stigma* and *Leucopholis rorida*. A mining caterpillar, *Aproaerema merteria*, was also very harmful in one locality. Sweet potatoes were infested by *Cylas formicarius* (*turcipennis*), but this weevil did little damage.

Forest pests included the teak caterpillar, *Hyblaea puera*, and the twig-borer, *Hypsipyla robusta*, which is a serious pest in plantations of young mahogany. Young trees of *Pterocarpus indicus* were severely attacked by a leaf-mining caterpillar, ? *Lithocolletis* sp. Sandalwood trees were attacked by the caterpillars of *Thyca belisama*, Cram., and by the red twig-borer, *Zeuzera coffeae*.

Cacao pests of importance were *Helopeltis* and the cacao moth [*Acrocercops cramerella*]. Rubber pests included a boring beetle, perhaps *Scolytoplatypus* sp., attacking quite healthy trees, and *Coptotermes gestroi*. *Phaseolus radiatus* was attacked by *Herse* (*Protoparce*)

convolvuli and pod-borers, *Etiella zinckenella*?, while the young flower-buds were injured by a weevil, *Balaninus* sp.

A cotton bollworm, *Earias fabia*, and a bug, *Dysdercus cingulatus*, were unimportant pests of cotton. Kedelé [*Glycine hispida*] was attacked by the pod-borer, *Etiella zinckenella*, the stem-borer, *Agromyza sojae*, and leaf caterpillars.

Cinchona pests included *Helopeltis antonii*; a scale-insect, probably *Pseudococcus citri*; the caterpillars of *Attacus atlas* and *A. ricini*, which in some cases entirely defoliated the plants and of which 290,000 were collected in August and September in one district; the caterpillars of *Euproctis flexuosa*, *Metanastria hyrtaca* and *Odonestis plagifera*; and the mites, *Liacarus* sp., *Tetranychus bimaculatus* and *Brevipalpus obovatus*.

Coconuts were attacked by the caterpillars of *Brachartona catoxantha*, *Parasa lepida* and *Melissoblaptes rufovenalis*; the coconut beetle, *Oryctes* [*rhinoceros*]; the palm weevil, *Rhynchophorus* [*ferrugineus*]; and the Hispid beetle, *Brontispa longissima*.

Coffee continued to be severely infested by the coffee-berry beetle, *Stephanoderes* [*hampei*], so that some firms contemplate giving up coffee planting. *Xyleborus coffeae* and *Zeuzera coffeae* caused injury in some cases. The scales, *Pseudococcus virgatus*, *P. crotonis* and *Coccus* (*Lecanium*) *viridis*, and the coffee weevil, *Araecerus* [*fasciculatus*] also occurred on coffee.

Maize was attacked in its flowering period by Coccinellid beetles, *Verania* sp., which destroyed the male blossoms and the pistils of the female ones. Oil palms were infested by *Oryctes rhinoceros*, *O. trituberculatus*, *Rhynchophorus ferrugineus* and bagworms (Psychids). Bananas were slightly injured by the banana moth, *Nacoleia* (*Notarcha*) *octosema*.

Rice was attacked by *Schoenobius incertellus* (*bipunctifer*), *Nymphula* [*depunctalis*] and *Spodoptera mauritia*. Sugar-cane was infested by an Aphid, *Oregma lanigera*, *Aleurolobus* (*Aleurodes*) *longicornis*, and the caterpillars of a Limacodid, *Thosea* sp.

Tobacco pests included the caterpillars of *Heliothis assulta*, *Dausara* (*Botys*) *talliusalis*, *Phytometra* (*Plusia*) *signata* and *Phthorimaea* (*Gnorimoschema*) *heliopa*, and the small green tobacco bug, *Dicyphus nicotianae*.

Tea was not seriously injured by *Helopeltis*, as the measures adopted kept this pest in check. The dry weather favoured mites such as *Brevipalpus* [*obovatus*] and *Tetranychus bioculatus*; these mites generally disappear with the advent of the rains. Caterpillars of *Andraca bipunctata*, *Boarmia* sp. and *Acanthopsyche* sp. also attacked tea. In Sumatra the beetles, *Phytorus* [*dilatatus*] and *Microserica* were kept down by appropriate measures.

Kalshoven (L.), Klein (—), Kramer (F.) & De Leeuw (H. A. L.). **Zoölogische Bijdragen. 6. De rupsenplaag van 1921–1922 in de Tjemara-bosschen bij de Bromo.** [Notes on Forest Zoology for the Dutch East Indies. 6. The Caterpillar Outbreak of 1921–1922 in the Forests of *Casuarina montana*, near the Bromo Crater.]—*Tectona*, xvi, no. 7, pp. 608–627, 1 plate. Buitenzorg, 1923. [With a summary in English.]

Forests of *Casuarina montana* in East Java were totally defoliated from December 1921 up to the end of 1922. A detailed study of the attack could not be made, but the moth concerned seems to be new

to science. The outbreak was limited to a relatively small area of the extensive pure *Casuarina* forests. The defoliation was very severe in the first half of 1922, some stands being attacked at least three times, and then the outbreak gradually diminished until no more caterpillars were to be seen at the end of December. A few reappeared in March 1923.

The eggs were laid in rows along the twigs. No information was obtained about the duration of the various stages, but the complete life-cycle appears to require 7–8 weeks. It is not possible to say exactly what natural factors checked the infestation or whether the volcanic vapours from the crater played any part. Birds were observed eating the moths and caterpillars, and spiders preyed on the former. A Chalcid egg-parasite was found to have destroyed 40 per cent. of a batch of about 430 eggs. Ichneumonids and Chalcids were bred from the caterpillars, and Ichneumonids and Tachinids from the pupae. It is probable that the outbreak was checked by the joint action of various parasites.

The *Casuarina* forests are of no great value as the timber is only of moderate quality and the woods are in situations of some altitude. As, moreover, the trees recovered after repeated defoliation and seem to be very resistant generally, the pest may be considered to be of minor importance.

KALSHOVEN (L. G. E.). **Zoölogische Bijdragen. 7. Schade ondervonden van Drooghoutboeboek (Lyctidae).** [Notes on Forest Zoology for the Dutch East Indies. 7. Damage done by Powder-post Beetles.]—*Tectona*, xvi, no. 8–9, pp. 718–740, 1 plate. Buitenzorg, 1923. [With a summary in English.]

The chief points of interest in this paper have already been noticed from a shorter one on the same subject [*R.A.E.*, A, xi, 542].

WILSON (C. E.). **Truck-crop Insect Pests in the Virgin Islands and Methods for combating them.**—*Virgin Islands Agric. Expt. Sta., St. Croix*, Bull. 4, 35 pp., 24 figs. Washington, D.C., 1923.

Brief notes on the life-histories of and remedial measures for the various pests that attack vegetables in the Virgin Islands are given. Some of the less well known are *Nacoleia indicata* (bean leaf-webber), *Fundella cistipennis* (bean pod-borer), *Phytometra* (*Plusia*) *ni* (lettuce looper), *Hellula phidilealis* (mustard stem-borer), *Phthorimaea* (*Gnorimoschema*) *gudmanni* infesting the flower buds of pepper, *Tarsonemus latus*, a mite injurious to leaves of pepper, *Sylepta helcitalis* (sweet potato leaf-folder), and *Phthia picta*, a bug injurious to tomatos.

GIBSON (A.). **Report of the Dominion Entomologist for the two Years 1919 and 1920.**—*Canada Dept. Agric.*, 40 pp., 2 figs. Ottawa, 1923. [Received 5th November 1923.]

Cutworms were the cause of much damage in various parts of Canada in 1919, particularly in the Prairie Provinces, and in 1920 they were responsible for important injury in all Provinces. The worst outbreak of grasshoppers for many years occurred in 1919, the species involved being *Camnula pellucida*, Scudd., and *Melanoplus atlantis*, Riley. Both these species caused much loss in 1920, and the various experiments undertaken against them are described. *Cephus cinctus*, Nort. (western wheat-stem sawfly) caused heavy damage in both years

under review, and an outbreak of this severity has not previously been known. *Pyrausta nubilalis*, Hb. (European corn borer) was first recorded in Canada in August 1920, and wide publicity has been given to its bionomics and remedial measures for it. Among other pests affecting field crops were *Loxostege sticticalis*, L., *Empoasca mali*, Le B., *Blissus leucopterus*, Say, *Cirphis unipuncta*, Haw., *Leptinotarsa decemlineata*, Say, *Mayetiola destructor*, Say, *Hylemyia antiqua*, Mg., and *Phorbia* (*H.*) *brassicae*, Bch.

Forest and shade tree pests included *Tortrix* (*Harmologa*) *fumiferana*, Clem. (spruce budworm), investigations in 1920 indicating that this pest has spread considerably, and *Lygaeonematus* (*Nematus*) *erichsoni*, Hartig (larch sawfly), which caused extensive injury in 1919. The operations for the control of bark beetles in British Columbia are briefly outlined.

Studies on important orchard pests in both years are reviewed. Pests of greenhouses and ornamental plants included *Neocerata* (*Dasyneura*) *rhodophaga*, Coq., *Phlyctaenia ferrugalis*, Hb., and *Trialeurodes vaporariorum*, Westw.

Considerable progress has been made in the development of improved insecticides, the most important results being obtained with dusting, and methods were also developed for the utilisation of white arsenic as an insecticide in Bordeaux mixture. Studies of the natural control of certain important pests were continued on similar lines as in preceding years, additional data being obtained as regards *Tortrix fumiferana*, Clem., *Hyphantria cunea*, Drury, *Malacosoma disstria*, Hb., and others.

The administration of the regulations under the Destructive Insect and Pest Act is reviewed, and the various amendments are noticed.

WEISS (H. B.). **The Occurrence of the Devastating Nematode of Europe, *Tylenchus dipsaci*, Kuhn, in New Jersey.**—*New Jersey Dept. Agric., Bur. Statistics & Inspec.*, Circ. 64, 3 pp., 2 figs. Trenton, N.J., June 1923. [Received 5th November 1923.]

Tylenchus dipsaci has been found in plants of *Phlox decussata* in New Jersey. The lower half of the stem was swollen. Many of the leaves were wrinkled, and some were tightly rolled in towards the midrib, this being most pronounced in young leaves at the tips of plants. The work of previous authors on this Nematode is briefly reviewed. The pest was probably introduced into New Jersey on bulbs imported from Holland, and in view of the large importations of such stock in the past few years, it is likely to be discovered in other eastern States.

ANDERSON (T. J.). **Sterilisation of Maize.**—*Rept. Proc. Maize Conference, Nairobi, 1923*, pp. 36–40. Nairobi, 1923.

No chemical treatment known to the author is sufficiently rapid in penetrating grain to be practical for killing the eggs of weevils if large quantities of grain have to be dealt with. Insects exposed to a heat of 120–122° F. die with prolonged exposure ; at higher temperatures they die more rapidly, and at 140° F. all stages are destroyed in about 3 minutes. Various heating machines are described. The test of efficiency of treatment is to keep maize long enough to ensure that any egg left alive has had time to give rise to an adult, which in the case of the weevil [*Calandra granaria*] requires at least three

weeks. It has been found that by using a drier at the proper temperature for the proper length of time 100 per cent. mortality is obtained without injury to the grain. The cost of heating apparatus and treatment is discussed.

The Olive Fly (*Dacus oleae*) **and its Parasites in Morocco.**—*Internat. Rev. Sci. & Pract. Agric.*, N.S. i, no. 3, p. 783. Rome, July-September 1923.

The observations here described were made by the Institut Scientifique Chérifien, Morocco, and have been applied in practice in the olive region of Marrakesh.

In this area the development of *Dacus oleae* does not appear to agree with that in several other countries. The late appearance of the fly (mid-November) and the rapid spread of the attack apparently exclude the possibility of successive generations during the summer. The beginning of the attack also seems to coincide with the first rains. By mid-December the majority of larvae have left the fruit. They have to search for a shelter in which to pupate, but the soil in this area, when not broken up, is extremely hard and many of them die. The excessive heat of Marrakesh during summer may also be detrimental to *D. oleae*.

The parasite of this fly, *Opius concolor*, has been observed, and eggs have been obtained in the laboratory. It is quite probable that *O. concolor* develops normally in Morocco.

[**Notes on Insect Pests.**]—*17th Ann. Rept. British Columbia Dept. Agric. 1922*, pp. W19–W66. Victoria, B.C., 1923.

These notes are compiled from the reports of various district inspectors, which, in addition to the information given in the subsequent papers, also discuss the following pests: *Otiorrhynchus ovatus* (strawberry root weevil), in connection with which the work of the past three years indicates the possibility of preventing future depredations; the raspberry-cane maggot [*Phorbia rubivora*], prevalent on young shoots of loganberry, though not causing any serious damage; the currant maggot [*Pteronus ribesii*], particularly injurious to black currants; the bud-moth [*Eucosma ocellana*], which has been causing considerable injury to apples and against which lead arsenate (1 lb. to 40 gals. water) was not very efficient; tent caterpillars [*Malacosoma*], which were extremely prevalent but were kept well under control by using lead arsenate in the pink spray; and the satin-moth [*Stilpnotia salicis*], causing considerable damage to poplars in the vicinity of Vancouver. Other pests recorded are [*Tortrix rosaceana*], the pear and cherry slug [*Eriocampoides limacina*], woolly aphis [*Eriosoma lanigerum*], and crane-fly larvae, the latter causing serious injury to strawberry fruit.

Eastham (J. W.). **Report of Provincial Plant Pathologist, Vancouver.** —*17th Ann. Rept. British Columbia Dept. Agric. 1922*, pp. W66–W70. Victoria, B.C., 1923.

The Colorado potato beetle [*Leptinotarsa decemlineata*, Say] has invaded British Columbia from Montana and has gradually spread north and east. It is essential that proper spraying or dusting machinery should be introduced into the district if adequate control

is to be obtained. The infested area did not extend during 1922, with the exception of a small outlying infestation that was probably the result of the introduction of hibernating beetles with potatoes from Alberta.

RUHMANN (M. H.). **Report of Assistant Entomologist, Vernon.**—*17th Ann. Rept. British Columbia Dept. Agric. 1922*, pp. W70–W72. Victoria, B.C., 1923.

The information given concerning the control of the oyster-shell scale [*Lepidosaphes ulmi*, L.] has been noticed from another source [*R.A.E.*, A, x, 564]. Experiments in removing the blossoms of apple trees with sprays in connection with the control of codling moth [*Cydia pomonella*, L.] warrant a further trial of this method.

Tortrix (*Archips*) *argyrospila* was recorded from various sections of the Okanagan Valley for the first time in 1922; this pest and the bud-moth, *Eucosma* (*Tmetocera*) *ocellana*, are responsible for extensive losses to the fruit-growers. So far no satisfactory remedial measures have been devised.

Considerable injury to apples is caused by a blister mite [*Eriophyes* sp.] in the Dry Belt; at present a late autumn spray of lime-sulphur is recommended, and in some cases good results have been obtained with dormant spring sprays, though these cannot always be depended on.

COOK (O. F.). **Boll-weevil Cotton in Texas.**—*U.S. Dept. Agric.*, Dept. Bull. 1153, 18 pp., 4 plates. Washington, D.C., 12th May 1923. [Received 23rd October 1923.]

Boll-weevil cotton is the expression used to describe the effects of injury by the boll-weevil [*Anthonomus grandis*, Boh.] in cotton plants, which are forced into rank growth and show an abnormal luxuriance that changes the form and appearance of the plants. As the insects during periods of dry weather are dependent upon the protection afforded by this thick growth, the advantage of cultural methods that will keep the lanes open between the rows is obvious. Wider separation of the rows, combined with closer spacing of plants in the rows, is a practical method of culture that is advantageous in dry seasons as well as under conditions of boll-weevil cotton. The indications are that the rows should not be less than 4 ft. apart and the plants not more than 6 in. apart in the rows to give the best assurance of suppressing secondary stalks, keeping the lanes open between the rows and avoiding boll-weevil cotton. In cases of emergency, the cutting out of alternate rows might be advisable.

AGULLÓ (M.). **Estudio y extinción de la** *Lymantria dispar*, **L. "Lagarta peluda," en Villanueva de Córdoba.** [The Study and Eradication of *Porthetria dispar* in Villanueva de Córdoba.]—*Rev. Fitopatología*, i, no. 2–3, pp. 45–52, 5 plates, 1 map. Madrid, 30th September 1923.

In this study of *Porthetria* (*Lymantria*) *dispar*, L., spring treatment consisted in spraying belts of oak trees with lead arsenate if crops were standing beneath the oaks, or with sodium arsenate. Paraffin was sprayed on the webs spun by young caterpillars in the hedges before migration to the oaks. Besides the larvae of *P. dispar*, those of *Malacosoma neustria*, L., and *Tortrix viridana*, L., were destroyed. No egg-parasites of *P. dispar* having been found in the autumn and

winter of 1921, large numbers of eggs infested with the Chalcid, *Anastatus bifasciatus*, Boy., were brought from the region around Madrid, and were thus introduced. In order to separate the larvae that may hatch from any unparasitised eggs in a given batch, the collected eggs are placed in containers, the edges of which are smeared with an adhesive. The caterpillars that hatch are thus caught. The Chalcids emerge from the parasitised eggs 2 or 3 months later, when eggs laid by the moth are available. An attempt is to be made to acclimatise another parasite, *Schedius kuvanae*, How.

AULLÓ (M.). **Cóccidos del olmo.** *Gossyparia spuria* **(Modeer).** [Coccids of the Elm. *G. spuria.*]—*Rev. Fitopatología*, i, no. 2-3, pp. 52-53, 1 fig. Madrid, 30th September 1923.

Except for *Kermes bacciformis*, Leon., infesting oak, scale-insects do not infest forest trees in Spain to any great extent. In order to facilitate their recognition it is intended to give a series of brief illustrated notes on them, in this case on *Gossyparia spuria*, Mod.

MERCET (R. G.). **Cóccidos de la encina.** *Asterolecanium ilicicola*, **Targioni.** [The Coccids of the Oak. *A. ilicicola.*]—*Rev. Fitopatología*, i, no. 2-3, pp. 54-61, 2 figs. Madrid, 30th September 1923.

Some oak forests near Huelva are infested with the Coccid, *Asterolecanium ilicicola*, Targ., hitherto recorded from Italy. The various stages are described, and it is suggested that the Spanish form is a distinct geographical race. A Chalcid parasite, *Aphycus* (*Euaphycus*) *asterolecanii*, sp. n., was obtained from this scale.

BOLÍVAR Y PIELTAIN (C.). **Estudios sobre Calcídidos de la familia Eupélmidos. II. Especies españolas de** *Calosota*, **Curt.** [Studies on the Chalcids of the Family Eupelmidae. II. Spanish Species of *Calosota*. Curt.]—*Rev. Fitopatología*, i, no. 2-3, pp. 62-69, 2 figs. Madrid, 30th September 1923.

The genus *Calosota* comprises about a dozen species from various parts of the world, including 4 European ones, none being known hitherto from Spain. The author has found 3 species in Spain: *C. fumipennis*, sp. n., *C. obscura*, Ruschka, and *C. aestivalis*, Curtis. A key to these is given. All the species of this genus seem to be parasites of Coleoptera, including *Anobium*, *Exocentrus* and *Hedobia*. Of the Spanish species, *C. aestivalis* was found parasitising *Trichodes leucopsideus*, Oliv. *C. fumipennis* was taken from the nest of a leaf-cutting bee, *Megachile* sp., that may have been previously parasitised by a Coleopterous host of the Eupelmid.

REBELLÓN (A.). **Estudio y extinción de la** *Thaumetopoea pityocampa*, **Schiff., "Procesionaria del pino," en Cuéllar (Segovia).** [The Study and Eradication of *Cnethocampa pityocampa* at Cuéllar, Segovia.]—*Rev. Fitopatología*, i, no. 2-3, pp. 77-79. Madrid, 30th September 1923.

In March 1923 energetic measures were directed against the pine processionary caterpillar, *Cnethocampa* (*Thaumetopoea*) *pityocampa*, Schiff., in the pine woods. About 87,800 webs on some 81,000 pines were destroyed by spraying with petrol or paraffin or by removal

and burning. It is estimated that there was an average of 150 caterpillars to a web. An Ichneumonid parasite, *Anomalon latro*, Schr., was found, and the Chalcids, *Schedius pityocampae*, Mercet, and a species of *Tetrastichus* close to *T. vinulae*, Thoms., were bred from the eggs.

Díaz (B.). **Parásitos de** *Lymantria dispar*, **L.** *Apanteles vitripennis*, **Hal.**—*Rev. Fitopatologia*, i, no. 2–3, pp. 80–82, 2 figs. Madrid, 30th September 1923.

Apanteles vitripennis, Hal., is a very abundant parasite of the larvae of *Porthetria* (*Lymantria*) *dispar*, L., in Spain, and may be regarded as a very effective check on this pest. No occupied cocoons of *A. vitripennis* were seen in winter, so that its life-history seems to be different from that of *A. melanoscelus*, Ratz.

Ceballos (G.). **Parásitos de** *Zygaena occitanica*, **Vill.** *Listrognathus hispanicus*, **Szepl.**—*Rev. Fitopatologia*, i, no. 2–3, pp. 83–90, 5 figs. Madrid, 30th September 1923.

The females of the Ichneumonid, *Listrognathus hispanicus*, Szepl., oviposit in larvae of *Zygaena occitanica*, Vill., that have just spun their cocoons. The life of this parasite differs from that of other Ichneumonids. The egg hatches in one day, and the larva at once perforates the skin of the caterpillar and sucks out the contents in 10–12 days; it is not really feeding, but is storing within itself the material from its host. It then enters into a passive stage, lasting 10–11 months, remaining within the cocoon of its dead host and living during the winter on the reserves of food that it has ingested. If removed from its shelter, it dies of desiccation in a few days.

Faes (H.) & Staehelin (M.). **Un dangereux parasite de l'abricotier en Valais : la** *Lyda nemoralis*.—*La Terre Vaudoise*, xv, no. 42, pp. 571–574, 2 figs. Lausanne, 20th October 1923.

This paper on *Neurotoma* (*Lyda*) *nemoralis* attacking apricot trees has already been noticed from another source [*R.A.E.*, A, xi, 529].

Murphy (P. A.). **On the Cause of Rolling in Potato Foliage, and on some further Insect Carriers of the Leaf-roll Disease.**—*Sci. Proc R. Dublin Soc.*, xvii, N.S. no. 20, pp. 163–184, 1 plate. Dublin, 1923.

The bulk of the information in this paper on the insect carriers of leaf-roll in potatoes, and the use of tetrachlorethane as a fumigant, has already been noticed [*R.A.E.*, A, xi, 392].

Rostrup (S.) & Thomsen (M.). **Bekaempelse af Taeger paa Aebletraeer samt Bidrag til disse Taegers Biologi.** [Control of Bugs on Apple Trees and Contributions to their Life-histories.]—*Tidsskrift for Planteavl*, xxix, pp. 396–461, 11 figs. Copenhagen, 1923. [With a summary in English.]

An account is given of spraying operations against the Capsids, *Plesiocoris rugicollis* and *Lygus pabulinus*, on apples. Spraying 10 days before and 10 days after blossoming was ineffective; spraying just before the blossoming proved the most satisfactory. The spray used contained 0·1 per cent. nicotine and 1 per cent. soap, with an addition of 0·2 per cent. lead arsenate on account of a preceding attack of *Cheimatobia brumata*. *L. pabulinus* hibernates in the egg

stage, chiefly on currant and apple, hatching early or late in May, according to the temperature. There are five larval stages, each lasting 5–6 days, and the larvae feed on growing leaves, shoots and young fruits. The larval and nymphal stages are described, and the characters distinguishing them from *P. rugicollis* are noted. Later the larvae are found on various plants, especially potatoes. At the end of June and in July eggs are deposited in the shoots of summer food-plants, such as potatoes, beans, etc.; and at the end of July and beginning of August the larvae of the second generation hatch and mature in 7–8 weeks. In September the females seek the winter food-plants, such as currant and apple, etc., to deposit the eggs that survive the winter. *P. rugicollis* has only one generation a year and does not migrate in the summer time.

The feeding habits of other bugs on apples are discussed, *Atractotomus mali, Psallus ambiguus* and *Orthotylus marginalis* being predacious on Aphids.

Sprøjtning mod Taeger paa Aebletraeer. [Spraying against Bugs on Apple Trees.]—*Statens Forsøgsvirksomhed i Plantekultur*, Medd. 100, 4 pp., 2 figs. Copenhagen, 19th April 1923.

This is a popular account of the preceding paper.

ROSTRUP (S.). **Beretning om Fritflueangrebet 1922.** [An Account of the Frit Fly Attack in 1922.]—Issued by *Foreningen af Jydske Landboforeningers Planteavlsudvalg*, 11 pp. Skanderborg, Denmark, 1923.

In 1922 *Oscinella* (*Oscinis*) *frit* caused serious damage to oats all over Jutland, this being the heaviest attack since 1905. The attacks of this fly usually occur at the end of May, but in 1922 it appeared much later, larvae being observed in southern Jutland from the 6th to 10th June, and pupae on the 12th. Late sown oats suffered the most. Oats sown at the end of May and early in June were not so severely attacked, as they came up when the first generation had deposited eggs and the second had not appeared. In 1905 the attack was favoured mainly by the very dry weather in June, but in 1922 the spring was very cold, causing late sowing and growth. The different varieties of oats attacked are given. The second generation also caused much damage in the tops of the plants.

Rodrigues Protection of Produce Regulations, 1923.—1 p. Mauritius, 31st March 1923.

The introduction into Rodrigues of any mammal, reptile, insect or bird is prohibited without a permit from the Director of Agriculture, also of any plant or part of *Opuntia* spp., *Lantana* spp., or *Cordia interrupta*, or of any living plant of any kind without a certificate of freedom from pests and diseases. All plants are subject to inspection at Rodrigues, and may be disinfected or destroyed if found infested.

CLAUSEN (C. P.). U.S. Bur. Ent. **The Biology of** *Schizaspidia tenuicornis*, **Ashm., a Eucharid Parasite of** *Camponotus*.—*Ann. Ent. Soc. Amer.*, xvi, no. 3, pp. 195–217, 2 plates. Columbus, Ohio, September 1923.

During the summer of 1921 in Japan the adults of *Schizaspidia tenuicornis* were very abundant; and the larvae were found to be

parasites of the cocoons of a subspecies of *Camponotus herculeanus*, which was very numerous. The eggs are laid within the buds of various trees and pass the winter in this condition. The trees preferred for oviposition are the white mulberry, *Morus alba* var., and the chestnut, *Castanea sativa*, but eggs have also been found in the white birch, *Betula* sp., the oak, *Quercus mongolica*, and in *Cladastis amurensis* var. *floribunda*. The buds of these trees all possess common physical characters; they are non-resinous, and the interior is loosely packed, allowing space for the egg-masses. A single female deposits 940–1,230 eggs, with an average of 1,050. When tree growth begins in early spring, the heavy scale coverings of the buds drop off and with them many eggs, which ultimately perish on the ground, but many remain on the buds. The egg stage lasts approximately 11 months. When the larvae hatch, the workers of *Camponotus* are feeding in numbers on the mulberry and chestnut trees and the parasites are enabled to attach themselves to them; they are thus carried to the nests and eventually attach themselves to the ant larvae, settling between the head and first thoracic segment. When the host larva pupates, the parasite in the second larval stage frees itself and eventually works back on to the newly formed pupa; the second moult is passed within 24 hours, and in the final larval stage the parasite lives upon the host pupa. The first larval stage occupies about 20 days, the second about 3 and the third about 4. The pupa of the parasite rests upon the remains of the host, and this stage lasts about 6 days. The adult remains within the cocoon for 1 or 2 days. It is probable that the adult does not feed. Swarming of the males occurs near the entrance of the nests, and pairing takes place immediately after the females emerge. The latter oviposit on the same day or the day after, and then die almost immediately. A description is given of all stages of this Eucharid.

Britton (W. E.) & Others. **Guide to the Insects of Connecticut. Part IV. The Hemiptera or Sucking Insects of Connecticut.**—*Connecticut State Geol. & Nat. Hist. Survey*, Bull. 34, 807 pp., 20 plates, 168 figs. Hartford, Conn., 1923.

Approximately 20,000 species of Rhynchota have been described, of which about 5,000 have been recorded in North America, and over 870 in Connecticut. A brief account is given of each of the latter. Many new species are described, particularly among the Capsids, and keys to the species of most of the genera are given.

Schultz (E. S.) & Folsom (D.). **Transmission, Variation, and Control of certain Degeneration Diseases of Irish Potatoes.**—*Jl. Agric. Res.*, xxv, no. 2, pp. 43–117, 15 plates. Washington, D.C., 14th July 1923.

The degeneration diseases of potatoes are discussed, and the authors explain their adoption of the names of certain pathogenic conditions. The methods of transmission of the diseases have been investigated, and the rôle of insects in this connection is discussed. In one variety of potato, the Aphid, *Macrosiphum solanifolii*, Ashm., was found to transmit mild mosaic, both alone and in combination with other degeneration diseases, while negative results were obtained with *Epitrix cucumeris*, Harr., and *Leptinotarsa decemlineata*, Say. Combinations of symptoms exist that include more than one degeneration

disease in the same plant. Aphids sometimes transmit only one disease from such a plant, though they more often transmit a combination. Natural transmission of the diseases by insects increases the difficulties of controlling them. The digging of selected healthy hills progressively later in the growing season was correlated with greater numbers of Aphids and with greater amounts of disease in the progeny. Proximity and heavy Aphid infestation increased the spread of mild mosaic, while sufficient isolation from diseased stocks reduced it, so that a state of freedom from the disease was maintained. Isolation by 100 ft. was insufficient, but over 1,300 ft. was adequate. Conditions that reduced Aphid dispersal from diseased to healthy hills also reduced the amount of disease transmission.

HAMLIN (J. C.). **Seasonal Adaptation of a Northern Hemisphere Insect to the Southern Hemisphere.**—*Jl. Econ. Ent.*, xvi, no. 5, pp. 420-423. Geneva, N.Y., October 1923.

The Pyralid, *Melitara junctolineella*, Hulst, which is indigenous to North America, where it feeds in the thick joints of western prickly pears [*Opuntia*], causing large swellings, has been introduced into Australia in connection with an attempt to control the prickly pear in that country. In Texas there are two generations a year, but during the 16 months immediately following the transportation of the insects to Queensland it was observed that three generations were produced. Judging from the reactions to the Australian seasons that have occurred up to the present, it seems likely that eventually *M. junctolineella* will have three generations annually in that country.

These observations throw some light upon the manner in which such adjustments are worked out. Those parts of a given generation that appear at unfavourable intervals are eliminated and only that part that appears at an opportune time will be preserved. Such a process should, after a number of generations, accomplish a thorough adjustment of the seasonal cycle in the new environment. The adults from the over-wintering larvae of *M. junctolineella* in Australia will probably emerge about the middle of October. About the end of January the second generation should begin, the adults of this generation emerging about mid-May. The larvae of the third generation would pass the winter in that stage. It is remarked that the adults of *M. junctolineella* are noticeably larger in Australia than in North America.

PARROTT (P. J.) & MACLEOD (G. F.). **Tobacco Dust as a Contact Insecticide.**—*Jl. Econ. Ent.*, xvi, no. 5, pp. 424-430. Geneva, N.Y., October 1923.

Experiments have been made to test the effect of tobacco dust against the Aphid, *Myzus persicae*, Sulz., on *Caryopteris mastacanthus*, which is grown extensively in greenhouses. The nicotine content and physical properties of tobacco dust are discussed. The finer grades of tobacco dust possessed greater killing powers than coarser preparations. Tobacco reground to 200-mesh fineness was superior to any other grade in toxicity to Aphids and in physical properties; 50-mesh or less showed low killing power and poor adhesive properties. Chemical analyses demonstrated that hydrated lime in combination with tobacco dust promotes the liberation of nicotine. The incorporation of such material as hydrated lime of 200-mesh fineness

improves the physical condition of tobacco dust. A study of the effects of the various mixtures, which are tabulated, shows that in general the mixing of hydrated lime with tobacco dust resulted in decreased toxicity. Tobacco dust alone was somewhat less toxic than mixtures containing free nicotine or nicotine sulphate. Free nicotine dust was more rapid in its paralysing effect than dusts containing nicotine sulphate, and tobacco dust was the least rapid in dislodging the insects. Mixtures in which kaolin was incorporated as a carrier of free nicotine or nicotine sulphate showed less than 80 per cent. killing efficiency, while the preparations using sulphur and calcium carbonate or hydrated lime as carriers of the nicotine were decisively more efficient.

GRIFFIN (E. L.). **The Constitution of Oil Emulsions.**—*Jl. Econ. Ent.*, xvi, no. 5, pp. 430–432. Geneva, N.Y., October 1923.

The following is the author's abstract: In an emulsion of mineral oil with soap and water the mineral oil is divided into very small droplets, which are suspended in the watery medium. The soap is added to keep these droplets from coalescing and finally separating out. Its action is as follows: Part of it is broken down, the fatty acids being dissolved in the kerosene and the alkali remaining in the water; part of it forms a film between the oil and the water, preventing the droplets from coalescing, thus stabilising the emulsion; and any excess soap remains in water solution and helps the spreading qualities of the spray.

The breaking down of the soap may be prevented, or at least made negligible, by the addition of excess alkali, thus preventing an apparent waste of soap.

Two emulsions of the type used in practice were analysed and the distribution of the soap in them reported.

CARTWRIGHT (W. B.). U.S. Bur. Ent. **Delayed Emergence of Hessian Fly for the Fall of 1922.**—*Jl. Econ. Ent.*, xvi, no. 5, pp. 432–435. Geneva, N.Y., October 1923.

The following is the author's abstract: A delayed emergence of Hessian fly, *Mayetiola* (*Phytophaga*) *destructor*, Say, occurred within a triangular area bounded by the Mississippi and Ohio Rivers and a line drawn eastward from St. Louis. Abnormal conditions of temperature and rainfall were the primary causes of this delayed emergence. Normal emergence consisted of two small waves on 22nd and 30th September respectively, from which progeny developed normally. The heavy delayed emergence occurred from 27th to 30th October, from which the progeny struggled through the winter with at least a 25 per cent. death-rate. Infestation by progeny of the late emergence caused total loss of 24 per cent. to 33 per cent. of wheat plants sowed on the usual recommended dates and some injury to an additional 24 per cent. to 37 per cent.

PRIMM (J. K.) & HARTLEY (E. A.). **Results of an Oil Spray in Treatment of Box Leaf Mines** (*Monarthropalpus buxi*, **Labou**).—*Jl. Econ. Ent.*, xvi, no. 5, pp. 435–440. Geneva, N.Y., October 1923.

The Cecidomyiid, *Monarthropalpus buxi*, Lab., has caused so much injury to boxwood, especially *Buxus sempervirens*, in Pennsylvania, that

the demand for this wood has been considerably reduced. The application of sticky material to the foliage, with the object of trapping the adults at the time of emergence and preventing oviposition, gave very promising results, but this method has been largely handicapped by the cost of the material used and the many failures owing to heavy rains during the period of emergence, which washed off the coating. There is no doubt that control could be obtained whether the material used were molasses, resin fish-oil soap, tobacco extract, or any other effective contact spray, provided that the time and frequency of applications were properly correlated with the emergence period and varying weather conditions. The period of emergence seems to be regulated by seasonal temperatures, and it must evidently be preceded by a settled temperature of 70–80° F. for 2 or 3 weeks. For very valuable specimen plants, fumigation with hydrocyanic acid gas is recommended as being probably the most successful treatment, but the expense and danger, and the limited period in which it is effective, *i.e.*, during the pupal stage of the insect, does not warrant its general use. A substance that is cheaper than molasses, more resistant to rain, and seems as effective, is a heavy emulsifying petroleum oil. The one tested with success has a Bé. registry of 16–17° and viscosity 1,200 at 70° F. The results of the experiments described indicate that one or two applications of this oil, using 1 part to 20 parts of water, with the addition of a pint of 40 per cent. nicotine sulphate (Black-leaf 40) to every 50 gals. of the spray, made about 1st May, or shortly before the beginning of emergence, will greatly reduce infestation. No repetition should be necessary even after 48 hours of hard rain. A second application should follow in about a week, or just before the height of emergence. A low pressure is advisable in applying the spray.

Essig (E. O.). **The European Earwig in California.**—*Jl. Econ. Ent.*, xvi, no. 5, pp. 458–459. Geneva, N.Y., October 1923.

The discovery is reported of the European earwig, *Forficula auricularia*, L., in California. It has already proved a serious pest in Oregon, both in the household and to agriculture.

Plank (H. K.) & Catchings (T. F.). *Scutellista cyanea*, **Mot., recovered at New Orleans, La.**—*Jl. Econ. Ent.*, xvi, no. 5, p. 459. Geneva. N.Y., October 1923.

The Chalcid, *Scutellista cyanea*, Mot., was liberated in Louisiana some 25 years ago with a view to reducing the barnacle scale, *Ceroplastes cirripediformis*, Comst., and apparently died out, for careful search failed to reveal its presence. It has now been recovered some 110 miles distant from the place of liberation. About 80 or 85 per cent. of the black scale, *Saissetia oleae*, Bern., on *Nerium oleander* in New Orleans seem to be parasitised by it.

Frost (S. W.). **An Outbreak of** *Amorbia humerosana*, **Clem., on Apple.**—*Jl. Econ. Ent.*, xvi, no. 5, p. 459. Geneva, N.Y., October 1923.

A serious outbreak of a leaf-roller, *Amorbia humerosana*, Clem., on apples has occurred in Pennsylvania, where the moth has occurred for many years on various wild food-plants. There is one generation in a year, the larvae becoming mature towards the end of August or beginning of September. They winter as pupae, and the adults issue in April and May of the following year.

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